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# FOREST INSECT CONDITIONS

## IN THE UNITED STATES 1962

FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE

# Foreword

Enactment of the Forest Pest Control Act by the Congress in 1947 culminated a long-term public support for a cooperative program among Federal and State governments and private agencies to more adequately protect the forests of the Nation against the inroads caused by insects and diseases. A program in surveys to detect outbreaks, and to evaluate their significance as a means of deciding for or against the need to suppress them, was inaugurated shortly after the legislation was enacted. Beginning in 1950, summary reports on the status of the more important forest insects throughout the country, and of action taken in suppression, were compiled and released annually for the information of persons interested in the protection program. This report is the thirteenth in the series.

Growing concern by the American public over the use of pesticides for controlling insects and diseases in the United States prompted joint action by the Secretaries of Agriculture, Interior, Defense, and Health, Education and Welfare to provide for thorough review of control plans by all Federal agencies using pesticidal chemicals. Accordingly, a Federal Pest Control Review Board, with representative membership by all interested Federal agencies, was established late in 1961. This Board carefully screened and cleared the 1962 control plans of the Forest Service and its cooperators after determining that hazards to water, recreation, food and feed crops, as well as to fish and game, were adequately safeguarded.

Information presented in this report by entomologists in Forest Service Regions was obtained by them and by their cooperators in other Federal, State, county, and private agencies. This assistance by cooperators is gratefully acknowledged. Without it, the report would not be complete.

Comments on the content of this report are welcome.

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# Contents


| | Page |
|---|---|
| Highlights | 1 |
| Conditions of forest insects in forest regions | 3 |
| Alaska | 3 |
| Oregon and Washington | 3 |
| California | 6 |
| Northern Rocky Mountain States | 9 |
| Intermountain States | 13 |
| Central Rocky Mountains | 15 |
| Conditions of forest insects in forest regions—Continued | |
| Southwestern States | 17 |
| Lake and Central States | 19 |
| Southern States | 22 |
| Northeastern States | 25 |
| Index to insects | 28 |

# FOREST INSECT CONDITIONS IN THE UNITED STATES, 1962

## Highlights

Unprecedented epidemics of bark beetles in the Western and Southern States, coupled with wide-scale outbreaks of defoliators in many other places throughout the country, marked 1962 as a high-watermark in forest insect damage in the United States in the past decade. Cyclonic winds which uprooted and snapped off many thousands of trees in the coniferous forests of coastal Oregon and Washington, and elsewhere in the West and South, portend additional serious epidemics of bark beetles in these areas unless the windthrown trees are quickly salvaged. Many other insects, such as the western hemlock looper, pitch pine looper, elm spanworm, tent caterpillars, pine sawflies, cankerworms, weevils, scales, leaf miners, and others that occurred in outbreak at many places also caused serious losses. Infestations of major significance in various sections of the country are highlighted in the paragraphs to follow.

California's forests sustained greater damage from insects than at any time since the mid-1930's. The most serious problem was a western pine beetle epidemic in ponderosa pine along the lower front of the Sierra Nevada. These infestations, extending from Placer County on the North to Kern County on the South, encompassed more than a million acres. Within this gross area, the beetles killed an estimated 1 billion board feet of timber. Public and private agencies attempted control of the epidemic by logging the infested trees or by spraying them with toxic oils in areas inaccessible to logging, or in cases where they were unmerchantable.

Bark beetles were also destructive in the pine forests of Oregon and Washington. The western pine beetle developed to critical levels in southern Oregon, and the mountain pine beetle caused heavy tree losses along the Cascade Mountains of both States. The heavy windthrow in the coastal forests of Oregon and Washington resulting from the October 12, 1962, hurricane and strong winds in later storms will provide ideal breeding grounds for the Douglas-fir beetle; therefore, epidemic losses are probable in 1963 and 1964 unless the down material—some 10 to 12 billion board feet of it—is quickly salvaged. Control of the bark beetles in Oregon and Washington is being attained by salvaging infested trees and by projecting logging into high-hazard stands. There is a "crash" program planned to salvage the trees blown down and snapped off by the cyclonic winds.

The forests in the Intermountain States were plagued by a variety of insects. The most important problem was the extremely aggressive mountain pine beetle attack in stands of lodgepole pine in Utah, Wyoming, and Idaho. More than 40 epidemics, ranging in size from a few to over 160,000 acres, occurred in these States and upwards of 400,000 trees were killed. Damaging infestations of Douglas-fir beetle, Engelmann spruce beetle, spruce budworm, aspen leaf tier, and pinyon needle scale also were prevalent in the forests of these States. Major campaigns were undertaken to suppress the mountain pine beetle. Where possible, the infested trees were logged and the timber sold. Where the infested trees could not be sold, even at giveaway prices, they were treated with toxic chemicals, felled and burned, or burned standing, depending on the economics in local areas. The scope of control for the other insects was quite limited.

In the northern and central Rocky Mountains and in the Southwest, bark beetles and defoliators were the major problems. The spruce budworm was epidemic on some 2½ million acres of mixed-fir forests in Montana and on approximately 1 million acres in northern New Mexico and southern Colorado. The Black Hills beetle killed large numbers of ponderosa pine along the Front Range in Colorado, and at other places including South Dakota and Wyoming. The Engelmann spruce beetle was particularly serious in high elevation spruce stands in northern New Mexico, and at one location in southern Colorado. Aerial spraying for control of the spruce budworm was undertaken in areas where tree killing was occurring or imminent. Spray projects in New Mexico, Colorado, and Montana totaled 982,000 acres, with excellent results in most areas. Control was also undertaken against the Engelmann spruce beetle in New Mexico and Colorado. For the most part, attacking beetles in these areas were trapped in felled green trees or in logging slash. At an appropriate time, the logs were then harvested and milled or the

slash was burned. Logging also was used extensively for control of Black Hills beetle, supplemented as needed by spraying the infested trees with toxic oils.

Virulent and large-scale outbreaks of the southern pine beetle dominated the forest insect scene in the South and Southeast. Epidemics were most severe in Alabama, Georgia, Mississippi, North and South Carolina, and Texas. The epidemics in the latter State grew from a gross infested area of 600,000 acres at the end of 1961 to an estimated 4,500,000 acres by July 1962. In Alabama new infestations killed approximately 50,000 trees. Similar losses occurred in Mississippi. Explosive populations in the Piedmont area of Georgia and the Carolinas killed more than a million trees. Federal, State, and private agencies waged major campaigns against these epidemics. This action, together with the effects of natural control factors, turned the tide against the beetles in most areas. Extremely high temperatures during mid-July, along with a heavy infestation of predaceous mites, are believed to be important factors contributing to the decline of the infestations in Texas. In other areas, control was by logging infested trees and by spraying with toxic oils those that couldn't be logged.

The spruce budworm, a pine tussock moth, several hardwood defoliators, and other forest insects were the major problems in the Lake States, Central States, and the Northeast. The spruce budworm remained serious in northern Minnesota. It worsened and spread in Maine. New infestations of a pine tussock moth were discovered in Wisconsin. The jack pine budworm was reduced by natural factors in most areas in Michigan and Wisconsin, but damaging infestations persisted in local areas. Spring and fall cankerworms defoliated oaks and hickories in portions of Missouri, Wisconsin, Minnesota, New Jersey, and other States. A pine looper occurred in outbreak in stands of pitch pine over much of Cape Cod. The gypsy moth was abundant in the New England States, and outside the regulated area in Pennsylvania and New York. The commercial and esthetic value of the forest resource affected by these and other insects prompted public and private agencies to undertake control of the most damaging infestations. Spruce budworm, jack pine budworm, and the pine tussock moth were sprayed by aircraft in Minnesota and Wisconsin. Gypsy moth was also aerially sprayed in Pennsylvania and New York. Sawflies, spittlebugs, white pine weevil, and others were controlled as needed by ground and aerial methods.

Federal appropriations used to control forest insects on lands administered by Federal agencies, and for the Federal financial share of cooperative projects to suppress outbreaks on non-Federal lands in 1962 totaled $5,756,000. The major projects, their locations by States, and the approximate expenditures are shown in the tabulation following.

| *Project* | *Location* | *Expenditure* |
|---|---|---|
| Mountain pine beetle | Utah, Idaho, Wyoming | $1, 860, 000 |
| Southern pine beetle | South, Southeast | 1, 422, 700 |
| Engelmann spruce beetle | Rocky Mountains, New Mexico | 710, 600 |
| Western pine beetle | California, Orgeon | 335, 700 |
| Black Hills beetle | Rocky Mountains, Wyoming, South Dakota | 139, 600 |
| Black turpentine beetle | South, Southeast | 99, 000 |
| Spruce budworm | Minnesota, Montana, Colorado, Washington, New Mexico. | 978, 400 |
| Jack pine budworm | Michigan, Minnesota | 63, 400 |
| Western hemlock looper | Oregon | 46, 500 |
| Pine tussock moth | Wisconsin, Minnesota | 41, 200 |
| Elm spanworm | North Carolina, Georgia | 30, 300 |
| Miscellaneous bark beetles, weevils, shoot moths, sawflies, spittlebugs, and others. | Countrywide | 28, 600 |
| Total | | $5, 756, 000 |

# Conditions of Forest Insects in Forest Regions

## ALASKA

*By* David Crosby, Division of Timber Management, Juneau, Alaska

## Index to Insects

### Conditions in Brief

Sharp increases in populations of the black-headed budworm and severe defoliation of hemlock over most of the North Tongass National Forest portend a serious outbreak of this important pest in southeast Alaska. Bark beetles also were more numerous in this portion of the State. The Alaska spruce beetle increased in numbers and caused serious tree killing on the Kenai Peninsula and in the Copper River area. Damage caused by the cedar bark beetle was more prevalent than for the past several years. Defoliation of spruce by an undetermined geometrid on the Kachemak portion of the Kenai Peninsula decreased and a definite downward trend in populations of this pest seems evident. Hardwood defoliators occurred only in endemic numbers in the interior of Alaska. Damage by ips beetles was conspicuously absent.

### Status of Insects

**Black-headed budworm,** *Acleris variana* (Fern.). An abrupt increase in populations of the black-headed budworm occurred over most of the North Tongass National Forest. However, the status of infestations was relatively unchanged over much of the South Tongass National Forest. In the latter area, conspicuous defoliation, indicating heavy populations, was noted on Dall Island; in the vicinity of Craig, Prince of Wales Island; and on the West Arm of Chomley Sound.

On the basis of egg sampling during the fall months, heavy populations are predicted for 1963 on Admiralty, Baranof, and Chichagof Islands and elsewhere on the North Tongass National Forest. Barring population reductions from natural causes, artificial suppression may be needed in 1964 to prevent excessive tree mortality. A pilot control test is planned against the budworm in 1963 to determine the effectiveness of light dosages of DDT and to gain operational experience in aerial spraying using water-based aircraft.

**Hemlock sawfly,** *Neodiprion tsugae* Midd. In accordance with predictions, hemlock sawfly populations were at extremely low levels throughout southeast Alaska. Despite extensive sampling for sawfly eggs, none were found; thus, only light infestations are expected in 1963.

**Alaska spruce beetle,** *Dendroctonus borealis* Hopk. Populations of the Alaska spruce beetle increased severalfold in 1962 and caused moderate damage to spruce stands on the Kenai Peninsula and in the Copper River area. The rate of tree killing was below epidemic proportions, but the upward trend of populations portends more serious losses in 1963.

**Cedar bark beetle,** *Phloesinus squamosus* Blkm. There was a recurrence of infestations of cedar bark beetles in scrub stands of Alaska-cedar on Prince of Wales, Baranof, and Kupreanof Islands. In all cases, tree killing was confined to stands growing on poor sites.

**Ips (pine engravers),** *Ips* spp. Ips beetles were endemic in the spruce stands of interior Alaska. No abnormal rate of tree killing was reported from any previously infested areas.

**Unidentified defoliator.** A geometrid, tentatively identified as *Nepytia* sp., has caused heavy defoliation of white spruce on a portion of the Kenai Peninsula for several years. Larvae were less abundant in 1962 and the infestation was judged to be on the decline. Cumulative defoliation over a 50-square-mile area on the south shore of Kachemak Bay has severely weakened the trees, exposing them to attack by the Alaska spruce beetle.

## OREGON AND WASHINGTON

*By* P. W. Orr, Insect and Disease Control Branch, Division of Timber Management, Portland, Oregon

### Conditions in Brief

Insect outbreaks in Oregon and Washington increased slightly in size and severity over those occurring in 1961. Area of infestations totaled 1,305,170 acres. Bark beetles accounted for the majority of the damage. Both defoliating insect and sucking insect damage declined.

Western pine beetle infestations reached critical levels on portions of the Ochoco, Fremont, Malheur, and Deschutes National Forests in Oregon. The tempo of logging was increased in affected areas to remove infested trees and those deemed of high risk to beetle attack. Mountain pine beetle infestations in stands of western white pine caused heavy tree losses, particularly along the Cascade Mountains in both States. The heavy windthrow in western Oregon and elsewhere resulting from the October 12 hurricane will provide ideal breeding grounds for the Douglas-fir beetle and the western pine beetle and epidemic losses may occur in 1963 and 1964. The trend of other bark beetles varied with species but was generally upward.

The western hemlock looper caused heavy defoliation in mixed western hemlock stands near Naselle, Wash. Unless a complete reversal of the population trend occurs during the winter, control will be necessary on this area in 1963.

Eradication projects against the European pine shoot moth were successful in Spokane, Wash., and Salem, Oreg., in 1961. No new infestations were found in 1962. In Portland, Oreg., 18 infested trees were found in a previously unsurveyed area. They were destroyed in 1962. The outlook for successful eradication is encouraging.

The only direct control of bark beetles in the two States was a small maintenance project against the mountain pine beetle in Crater Lake National Park.

## Status of Insects

**Spruce budworm,** *Choristoneura fumiferana* (Clem.). Infestations in Douglas-fir and true fir stands increased in northeastern Oregon but decreased in southern Oregon. Aerial spraying on 45,500 acres in southern Washington in 1962 resulted in 99 percent larval mortality. No epidemic outbreaks were recorded in Washington.

The 1962 egg mass evaluation survey indicated a variable infestation trend on the Fremont National Forest, Oreg. The trend is upward, however, on the Wallowa-Whitman National Forests. Population density and resultant defoliation and top-killing were not severe enough in any infestation center to indicate need for artificial control in 1963.

**Western hemlock looper,** *Lambdina fiscellaria lugubrosa* (Hulst). Severe defoliation in mixed stands of immature and mature western hemlock occurred in the vicinity of Naselle, Wash. Some tree mortality has already occurred in localized areas and more is imminent if the infestation trend continues upward for another year. Unless the disease and parasites that were present in southwestern Washington reduce the overwintering egg population, control will be needed in 1963. In Oregon, some reinfestation occurred on areas sprayed in 1962. An egg evaluation survey is planned to assess the population trend.

F—503695

**An inexpensive nursery bed fumigation chamber for control of European pine shoot moth.**

**European pine shoot moth,** *Rhyacionia buoliana* (Schiff.). Early in 1962 the European pine shoot moth was found near Shelton, Wash., on native lodgepole pine. About the same time the moth was found on ornamental pines in Bellingham, Wash. Because of these finds, the European Pine Shoot Moth Committee of the Northwest Forest Pest Action Council recommended a containment zone be established from Olympia, Wash., north to the Canadian Border, west to the Pacific Ocean and east to the Cascade Mountains summit. Within this zone no eradication would be attempted but voluntary control would be encouraged. Outside the containment zone, eradication of infestations is being practiced.

Eradication surveys in Spokane, Wash., and Salem, Oreg., in 1961 were apparently successful since no new infestations were found this year. In Portland, Oreg., 18 infested pines in a previously unsurveyed part of the city were found and destroyed.

About 176 communities in Washington and 100 in Oregon were surveyed for shoot moth in 1962. Only one new infestation was found—at Aberdeen, Wash. This infestation was due to the movement of infested nursery stock in direct violation of quarantines. In addition to the community surveys in Oregon and Washington, spot checks were made in native lodgepole pine stands in the Puget Sound area from Blaine to Shelton, Wash., and along the Oregon Coast near Newport. Survey findings in the native lodgepole pine stands were negative.

Quarantines regulating the movement of infested pines have been adopted by the States of Washington, Oregon, Idaho, California, Montana,

Utah, and Nevada. The Federal Government has adopted similar quarantines regulating importation of pines.

Practical fumigation schedules using methyl bromide have been developed. Procedures now are available for fumigating ornamental pines in place as liners, or as balled, bundled, or container stock. This, together with strict quarantine enforcement, will do much to slow the spread of the moth in the Northwest.

**Douglas-fir tussock moth,** *Hemerocampa pseudotsugata* McD. Only two small outbreaks occurred near Spokane, Wash.; one was in a small farm woodlot and the other in a relatively small second-growth Douglas-fir stand. Neither infestation was serious. However, both are being watched closely because of the threat they pose to the surrounding timber. No control is planned for 1963.

**Douglas-fir needle gall midge,** *Contarinia* sp. This insect caused light to severe defoliation on Douglas-fir on parts of the Wallowa-Whitman National Forest in Oregon. In the affected area, Christmas tree values have been seriously reduced but no tree mortality has occurred yet. No control measures have been developed.

**Larch casebearer,** *Coleophora laricella* (Hubner). Infestations flared up once again in northeastern Washington, causing light to moderate defoliation of western larch. Outbreaks occurred on Mica Peak and Mt. Spokane, near Spokane, Wash. Elsewhere in northeastern Washington there appeared to be a general population increase. No control is planned.

**Sawflies,** *Neodiprion* spp. In general, sawfly populations were higher in both States. Some caused extensive damage but others did not. Light to severe defoliation of lodgepole pine, ponderosa pine, and knobcone pine occurred on the Umpqua National Forest in Oregon. Parasitism and disease may have reduced this population during late fall. On the Umatilla National Forest, Oreg., a sawfly caused light defoliation over extensive areas of ponderosa pine. Western larch on 2 areas on the Wallowa-Whitman National Forests in Oregon were moderately defoliated by an unidentified species. No control is planned against any of the sawflies.

**Pine needle-sheath miner,** *Zelleria haimbachi* Busck. Light infestations developed in young ponderosa pine stands near Ashland, Oreg. Light to moderate defoliation continued in an older center of damage in lodgepole pine near Olympia, Wash. Other subepidemic damage was reported from many areas in both States. Larval and pupal parasites were abundant, indicating a possible downward trend of populations in 1963. Direct control is unnecessary.

**Western oak looper,** *Lambdina fiscellaria somniaria* (Hulst). Older outbreaks in Oregon white oak near Dallas and Monmouth, Oreg., subsided. New infestations developed near Wren and Salt Creek, Oreg., and in other widely separated locations in the Willamette Valley. Outbreaks of this defoliator usually subside quickly without causing lasting damage to the stands. The trend is apparently downward; hence, control is unnecessary in 1963.

**Balsam woolly aphid,** *Chermes piceae* (Ratz.). The acreage of epidemic outbreaks decreased in Oregon but increased slightly in Washington. The majority of the outbreaks in subalpine fir were centered on the Willamette National Forest in Oregon. Heaviest and most extensive losses in Pacific silver fir stands occurred on the Gifford Pinchot National Forest in Washington and on the Siuslaw National Forest in Oregon. In Pacific silver fir stands, the trend is variable. In subalpine fir stands, the trend is slightly upward.

**Pine needle scale,** *Phenacaspis pinifoliae* (Fitch). Considerable damage in ponderosa pine occurred in and near The Dalles and in the lower Hood River Valley, Oreg. Subepidemic losses were fairly common in other ponderosa pine stands in both Oregon and Washington. This insect and the damage it caused are not sufficiently important to warrant control.

**Mountain pine beetle,** *Dendroctonus monticolae* Hopk. The total infested acreage in western white pine, lodgepole pine, and young ponderosa pine stands decreased slightly but losses remained very high. The majority of the losses in western white pine stands were centered on the Gifford Pinchot National Forest in Washington and on the Mt. Hood National Forest in Oregon. Aggressive logging operations to salvage infested trees were undertaken on heavily affected areas on the Mt. Hood National Forest. Similar operations will be started soon on the Gifford Pinchot National Forest. The largest outbreaks in lodgepole pine stands occurred on the Winema, Fremont, and Deschutes National Forests in Oregon, and on the Colville National Forest in Washington. Attacks in stagnated pole-size ponderosa pine stands decreased in Oregon and remained static in Washington.

Maintenance control was carried on against this beetle in lodgepole pine stands in Crater Lake National Park.

**Western pine beetle,** *Dendroctonus brevicomis* LeC. Losses caused by this beetle increased in mature ponderosa pine stands in eastern and southern Oregon, particularly on the Ochoco, Fremont, Malheur, and Deschutes National Forest. Losses were generally lighter and less extensive in ponderosa pine forests in Washington. The trend of losses is strongly upward on Oregon forests and static to downward on Washington forests. Hurricane Frieda left millions of feet of ponderosa pine blown down in southern Oregon forests and this may further prolong the current outbreaks. Infested trees will be logged in most stands to control the beetle; however, the large volume of infested trees, together with the recent

windthrow, and a low lumber market, may necessitate chemical treatment for control in some areas in 1963.

**Douglas-fir beetle,** *Dendroctonus pseudotsugae* Hopk. Outbreaks declined in both States. In Washington the largest remaining infestations are on the Okanogan and Colville National Forests and on the Colville Indian Reservation. In Oregon the heaviest and most extensive losses occurred on the Wallowa-Whitman and Umatilla National Forests. The damage trend is downward in Washington and varies with locality in Oregon. Salvage of the extensive windthrow left in the wake of the October 12 storm is a must to minimize population increases that may result in extensive tree killing in 1964.

**Fir engraver,** *Scolytus ventralis* LeC. The acreage of fir engraver infestations doubled in 1962. The largest increases occurred in Oregon on the Umatilla, Fremont, Wallowa-Whitman, and Ochoco National Forests. Buildups also occurred on the Snoqualmie and Umatilla National Forests in Washington. Much of the mortality was in low-value overmature and decadent true fir stands; however, some occurred in apparently thrifty young stands, and in some places wiped out Christmas tree values. Outbreaks generally build up during drought periods and subside quickly when moisture conditions return to normal. Direct control is impracticable.

**Oregon pine ips,** *Ips oregonis* (Eichh.). Infestations in young ponderosa pine sapling stands in Oregon increased, particularly on the Wallowa-Whitman, Malheur, and Umatilla National Forests. Outbreaks in Washington decreased. With this beetle, it is better to prevent attacks by proper management practices, thereby precluding the need for direct control measures.

**Engelmann spruce beetle,** *Dendroctonus engelmanni* Hopk. Tree killing by this beetle was below normal in both States. In Oregon the principal infestations were centered on the Umatilla, Wallowa-Whitman, and Willamette National Forests. The majority of damage in Washington occurred on the Umatilla National Forest. The trend of infestations in both States is upward. Direct control is not necessary in 1963; however, currently infested trees should be logged in accessible areas. Heavily infested areas should be clear-cut.

**Douglas-fir engraver,** *Scolytus unispinosus* LeC. A few outbreaks of minor importance occurred on the drier sites on the Colville and Kaniksu National Forests in Washington and on the Mt. Hood National Forest in Oregon. The trend of damage is downward. No control is needed in 1963.

**Silver fir beetles,** *Pseudohylesinus* spp. Losses were very light in Pacific silver fir stands. One relatively small infestation occurred on the Siuslaw National Forest in Oregon. The damage trend there is static and no control, other than logging infested trees, will be necessary in 1963.

**Windthrown timber.** Hurricane Frieda struck Oregon and Washington on October 12, 1962, leaving an estimated 11.2 billion board feet of timber on the ground, creating a potential threat of bark beetle epidemics in 1963 and 1964. In the past, beetle epidemics have developed in windthrown Douglas-fir, ponderosa pine, and Engelmann spruce. A survey was made to determine the location and amount of the current windthrow. The beetle threat will be evaluated during the summer of 1963. Every effort is being made to salvage as much of the down timber as possible before the beetles attack, develop, and emerge to attack surrounding trees.

# CALIFORNIA

*By* GEORGE L. DOWNING, Division of Timber Management, San Francisco, California

## Conditions in Brief

California's forests sustained the greatest damage from destructive forest insects since the early 1930's. The most serious outbreak, which involves the western pine beetle in ponderosa pine, is designated "The Mother Lode Infestation." It occurs in the lower elevation pine belt, extending from Placer County south to Kern County. The Statewide fir engraver epidemic continued unabated, with the most serious tree losses in the Warner Mountains, Modoc County, and in high recreational use areas around Lake Tahoe. Infestations of the mountain pine beetle increased in old- and young-growth sugar pine in the southern Sierra Nevada, and old-growth lodgepole pine and young-growth ponderosa pine in Modoc County. In southern California the western pine beetle, and Jeffrey pine beetle caused significant tree killing, particularly in areas that have not received protective treatment. Damage by ips beetles declined sharply since last year. Damage by the lodgepole needle miner decreased sharply in Yosemite National Park in the areas that have been treated. A sagebrush defoliator, *Aroga websteri* Clarke, defoliated sage and bitterbrush over a wide area in northeastern California.

The mid-October blowdown of an estimated 290 million board feet of timber in northern California presents a potentially serious threat of insect outbreaks in 1963 and 1964. All of the major coniferous tree species in the area are involved. Most of the blowdown will be salvage-logged, but insects are expected to attack many of the trees that are not logged. Insect broods which may develop in these trees can pose a serious threat to the surrounding standing trees.

## Status of Insects

**Western pine beetle,** *Dendroctonus brevicomis* LeC. Tree killing was light in the northern half of the State. In the central and southern Sierra

F—503696

**Aerial view of concentrated blowdown of Douglas-fir timber resulting from the October 12, 1962, hurricane may trigger beetle epidemics in 1964.**

Nevada, ponderosa pine losses in the lower elevation stands continue with 1962 losses estimated at about 1 billion board feet. The epidemic has spread eastward to higher elevations and into better timber growing sites. This outbreak was designated "The Mother Lode Infestation" by the California Forest Pest Control Action Council, and a special committee formed to expedite suppression action. Infested trees are being logged and direct control is being applied on selected areas.

In southern California, Coulter and ponderosa pine losses were particularly severe in stands that have not received some type of planned protection from insect pests. In 1962, one such area in Santa Barbara County suffered losses of 3,138 board feet per acre, or 28 percent of the stand.

**Ips (pine engraver),** *Ips* spp. Damage to ponderosa pine declined sharply since last year, particularly in the central and southern Sierra Nevada and in southern California. The decline is believed due to heavy late winter and early spring precipitation and to cool weather during the late spring and early summer.

687-733 O—63——2

**Fir engraver,** *Scolytus ventralis* LeC. The fir engraver continued to kill large numbers of red and white fir in all but the north coastal section of California. Tree mortality again was most severe in the Warner Mountains, Modoc County, in Lassen County, and throughout much of the central and southern Sierra Nevada.

**Mountain pine beetle,** *Dendroctonus monticolae* Hopk. Outbreaks were confined to northeastern California and to the lower elevation stands in the central and southern Sierra Nevada. An outbreak in young-growth sugar and ponderosa pine in Mariposa and Madera Counties increased sharply, and tree killing in 1962 on 10,800 acres was estimated at 53,000 trees and 6 million board feet.

Infestations in old-growth sugar pine caused increasingly heavier tree losses from Yosemite National Park south into Tulare County. One long-standing infestation in old-growth lodgepole pine and two in young-growth ponderosa pine continued to cause heavy tree killing in Modoc County.

F—503701

**Ponderosa pines killed by the western pine beetle and ips. In this portion of the "Mother Lode Infestation" ponderosa pine losses exceed 4,000 board feet per acre.**

F—503698

**Logging of insect-infested trees is the major control method used to suppress the "Mother Lode Infestation."**

**Lodgepole needle miner,** "*Recurvaria*" *milleri* Busck. There was marked improvement in the appearance of lodgepole pine stands in the Tuolumne River Basin of Yosemite National Park that were aerially sprayed with malathion in 1961. A serious problem remained in those stands that have not been sprayed, and additional control work is planned for 1963. An epidemic continued in lodgepole pine over a small area in Kings Canyon National Park.

An undetermined, but closely related, insect caused continued defoliation of lodgepole pine at Sentinel Meadows, Mono County.

**Pine reproduction weevil,** *Cylindrocopturus eatoni* Buch. This reproduction weevil continued to kill ponderosa pines in plantations and in natural reproduction throughout the low elevation central Sierra Nevada pine type. The heaviest damage occurred in Tuolumne County.

**California flatheaded borer,** *Melanophila californica* Van Dyke. In southern California, tree mortality was down from the peak epidemic years of 1957–1959, but significant Jeffrey pine tree killing continued in some of the recreation areas of San Diego, Riverside, and Kern Counties. Infestations in ponderosa pine in Modoc and Lassen Counties, and the southern half of the Sierra Nevada showed some increase. Infestations in individual ponderosa pines were often associated with activities of the western pine beetle.

**Jeffrey pine beetle,** *Dendroctonus jeffreyi* Hopk. Damage remained low in northern California, but significant Jeffrey pine tree killing in southern California occurred at four locations in San Bernardino County.

**Spruce budworm,** *Choristoneura fumiferana* (Clem.). An egg mass survey in the Warner Mountains, Modoc County, found budworm populations low except in two areas. At one of these locations white fir sustained heavy defoliation, and at the other moderate.

**Red turpentine beetle,** *Dendroctonus valens* LeC. Infestations were abundant in most commercial pine stands, but tree killing was restricted to a few infestations. An aggressive outbreak developed in fire-damaged ponderosa pine at Browns Flat, Los Angeles County.

**Large aspen tortrix,** *Choristoneura conflictana* (Wlk.). Insect populations in aspen remained high in restricted portions of the Warner Mountains, Modoc County, but little permanent damage resulted. A new infestation in aspen was discovered in this same general area.

**Blue-sided tent caterpillar,** *Malacosoma constrictum* Stretch. This tent caterpillar severely defoliated oaks in the vicinity of Mt. Wilson, Los Angeles County. Reports of oak defoliation were also received from Tulare and San Diego Counties.

**Douglas-fir twig beetle,** *Pityophthorus pseudotsugae* Sw. Young red firs were killed in Siskiyou County in a stand that had been thinned to promote Christmas tree production. Suppression of the infestation with lindane apparently was successful. This twig beetle also was found to have

F—503702

White fir tree killing by the fir engraver was common in the Warner Mountains of northeastern California.

damaged white fir young growth in several localized areas of northern California.

**White-fir sawfly,** *Neodiprion abietis* complex Ross. White fir Christmas tree stands in Modoc and Tehama Counties were damaged.

**Douglas-fir beetle,** *Dendroctonus pseudotsugae* Hopk. Little tree killing was reported. One small infestation in Shasta County was suppressed by logging the infested trees.

**Cedar bark beetles,** *Phloeosinus* spp. There was a general buildup of cedar bark beetles in incense cedar at lower elevations in the Sierra Nevada. The apparent cause of the buildup is a persistent drought condition that has weakened the trees. In many cases, drought is believed to be the direct cause of cedar mortality.

**Seed and cone insects.** A midge, *Contarinia* sp., and two cone moths, *Dioryctria abietella* (D. & S.), and *Barbara colfaxiana* (Kearf.), destroyed 75 percent of the seed of a good Douglas-fir cone crop. The sugar pine cone beetle, *Conophthorus lambertianae* Hopk., caused light losses of an excellent sugar pine cone crop. An excellent white fir cone crop was lightly infested with seed maggots, *Earomyia* spp. A moderate ponderosa pine cone crop in northeastern California sustained light seed loss from pine seed moths, *Laspeyresia* spp., the cone resin midge, *Rübsaamenia keeni* Foote, and the pine cone moth *Eucosma bobana* Kearf. A pine seed moth, *Hedulia injectiva* Heinrich, caused heavy seed loss to a light Jeffrey pine cone crop.

*Dichelonyx crotchi* Horn and *D. vicina* Fall destroyed 90 percent of the new cones on individual ponderosa pines in the Poison Lake Seed Production Area, Lassen County. This was the first time this insect has been known to cause serious cone damage.

**Sagebrush defoliator,** *Aroga websteri* Clarke. This little known insect defoliated sage and bitterbrush on thousands of acres, mainly in northeastern California, in the most widespread epidemic of this pest ever recorded in the State. It is not known how much permanent damage will result from the defoliation.

**Other insects.** Increased activity of the Douglas-fir tussock moth, *Hemerocampa pseudotsugata* McD., was noted in Tuolumne and Calaveras Counties. The flatheaded fir borer, *Melanophila drummondi* (Kirby), caused group-killing in scattered Douglas-fir stands of the central Sierra Nevada. Horntails, *Sirex* spp., continued to degrade lumber from fire-scorched white fir, red fir, and incense-cedar taken from the 1960 burns in Sierra, Nevada, and Placer Counties.

# NORTHERN ROCKY MOUNTAIN STATES

*By* Scott Tunnock, Division of State and Private Forestry, Missoula, Montana

## Conditions in Brief

Several species of insects were destructive to the forest resources in the northern Rocky Mountains in 1962. Mountain pine beetle infestations persisted at a high level in old-growth stands of western white pine on portions of the Clearwater, St. Joe, and Kaniksu National Forests, Idaho. The rate of tree killing by the Douglas-fir beetle increased in the Thompson and Fisher River Valleys, Gallatin and Deerlodge National Forests, Mont. Thousands of grand fir trees killed by the fir engraver in 1961 were discovered on some 184,000 acres of public and private lands in the eastern half of north Idaho. Spruce budworm infestations ranging from light to heavy occurred on more than 4½ million acres in Montana and Idaho. The budworm has been epidemic in the northern Rockies for 15 years. Larch casebearer infestations continued to spread north, east, and northwest of St. Maries, Idaho. Some 1,400 square miles of larch stands were infested in 1962—double the area infested in 1961.

## Status of Insects

**Mountain pine beetle,** *Dendroctonus monticolae* Hopk. The mountain pine beetle has caused serious losses in overmature stands of western white pine in northern Idaho for many years. Chronic infestations persist on portions of the Kaniksu, Clearwater, St. Joe, and Coeur d'Alene National Forests where from 2 to 5 percent of the trees are killed annually. The most serious infestation in 1962 occurred within about 2,000 acres in

the Priest River Drainage, near the Canadian border. Salvage of infested trees is being encouraged as a method of control.

Infestations in ponderosa pine were reported only from one area—10 miles southwest of Craigmont, Idaho. At that location, pole-size trees were lightly attacked on some 400 acres. Beetle populations increased slightly within the isolated stand of lodgepole pine in the northern part of Glacier National Park, Mont. This infestation was first discovered in 1950, and has fluctuated from year to year. Direct control has not been considered feasible.

**Douglas-fir beetle,** *Dendroctonus pseudotsugae* Hopk. On the basis of long-term records of the rate of tree killing by the Douglas-fir beetle in the northern Rocky Mountains, outbreaks seem to occur at intervals from 5 to 7 years. The level of losses sustained in Douglas-fir stands in 1962 points to the beginning of a new outbreak. An increased rate of tree killing occurred on the Gallatin National Forest, south of Bozeman and Livingston; on the Deerlodge National Forest, near Wise River; on the Seeley Lake Ranger District, Lolo National Forest; and along the Thompson River and Fisher River Valleys, Mont. Small groups of infested trees also were reported from the Clark Fork and Pend Oreille River Valleys, and on the Powell Ranger District, Clearwater National Forest, Idaho. Infested trees will be logged from all affected areas where sales can be made.

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**Stands of western white pine were heavily attacked by the mountain pine beetle in northern Idaho. Tree killing on the Clearwater National Forest shown here is typical of that on large acreages in the State.**

**Fir engraver,** *Scolytus ventralis* LeC. Large populations of the fir engraver developed in stands of grand and subalpine fir in northern Idaho during the long, dry summer of 1961. The results of the population buildup were clearly evident in 1962 when severe infestations were noted in several areas. The heaviest infestation, encompassing some 116,000 acres, extended south from Dent on the North Fork, Clearwater River to the Middle Fork and east from Orofino to Pierce. Severe tree killing also occurred on approximately 51,000 acres of the St. Joe National Forest. Moderate infestations were reported on some 9,000 acres south of Winchester on the Salmon River, and light infestations occurred on 4,600 acres of the Coeur d'Alene and Nezperce National Forests. The heaviest damage in Montana occurred on about 2,000 acres east of Big Fork.

**Ips (pine engravers),** *Ips* spp. There was a noticeable decline in the rate of tree killing by the Oregon pine ips, *I. oregonis* (Eichh.), throughout the stands of ponderosa pine in north Idaho and Montana. The beetles were abundant, however, in slash in stands thinned from May through July, particularly on the northern Cheyenne Indian Reservation, Mont. The slash in this area was sprayed with orthodichlorobenzene to kill the broods.

The western six-spined ips, *I. ponderosae* Sw., often associated with *I. oregonis* in affected areas, also was abundant in pine slash. Tree killing, however, was not severe.

**Douglas-fir engraver,** *Scolytus unispinosus* LeC. Outbreaks of the Douglas-fir engraver often develop in areas where young Douglas-firs are harvested for Christmas trees, or in stands that have been thinned. The outbreaks stem from a buildup of populations in slash. Two outbreaks in such areas were discovered in 1962. West of Ravalli, Mont., the engraver killed groups of pole-size trees, from 20 to 100 trees per group, throughout some 1,800 acres. Within the Mormon Creek Drainage, Lolo National Forest, they killed more than 1,600 pole-size trees on about 600 acres. In the latter area, attacking beetles are believed to have come from trees girdled during thinning.

**Red turpentine beetle,** *Dendroctonus valens* LeC. This bark beetle, normally but a minor pest

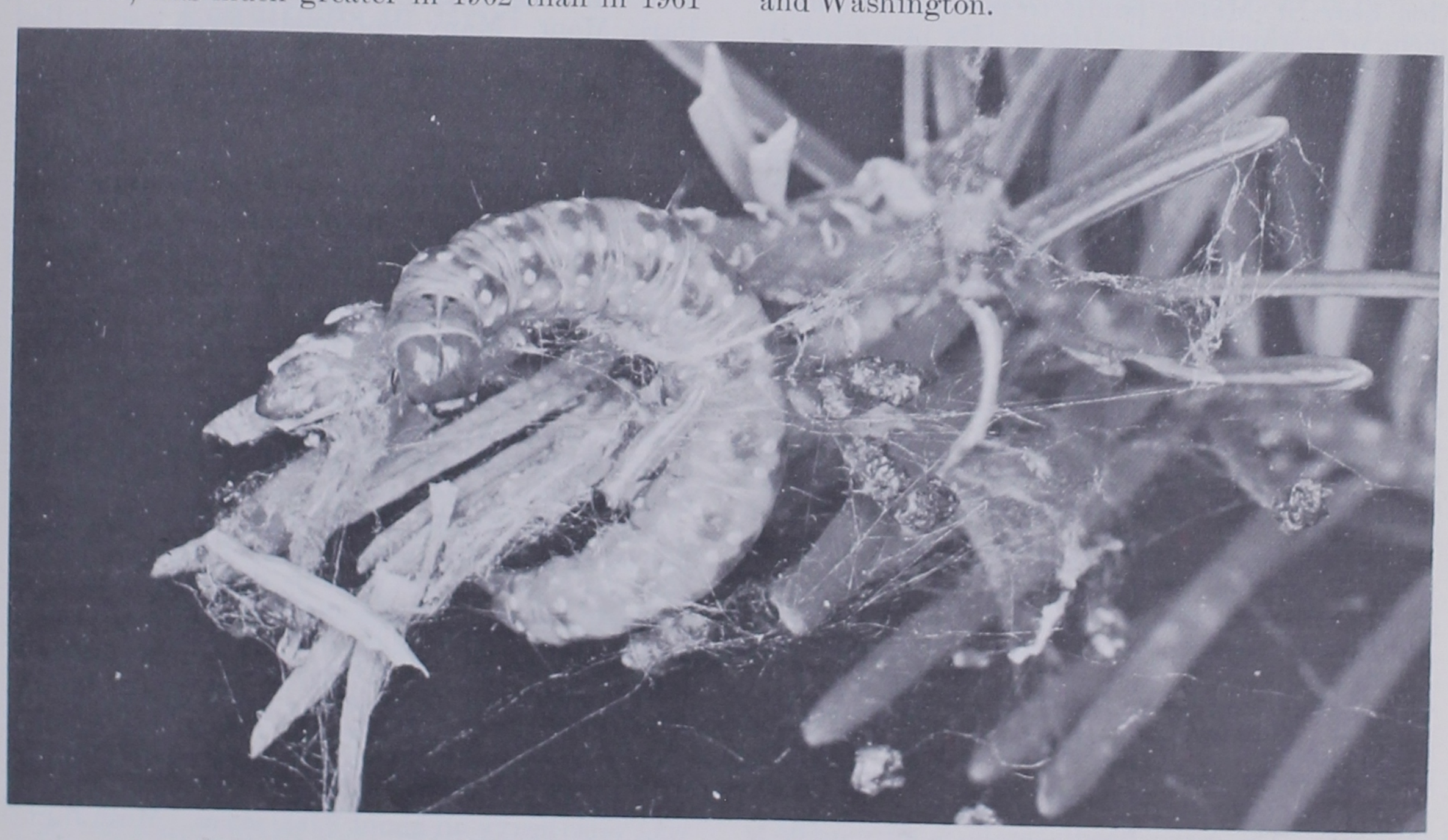
in the northern Rocky Mountains, was abundant and destructive in 1962. In eastern Montana, in stands of ponderosa pine that had been thinned and pruned, as many as three-fourths of the residual trees were attacked. The lower boles, often up to 4 feet from the ground, had heavy infestation all around the tree. Damage was most pronounced in thinned stands on the northern Cheyenne Indian Reservation. Another seriously affected area was in the Long River area, Custer National Forest. Control of the infestations was attempted by spraying the lower boles with orthodichlorobenzene in oil.

**Engelmann spruce beetle,** *Dendroctonus engelmanni* Hopk. For the first time in many years, there were no serious infestations of Engelmann spruce beetles reported in the northern Rocky Mountains. The Engelmann spruce trees blown down by strong winds in the South Fork Flathead River Drainage, Mont., were readily attacked, but they were promptly salvaged and a possible outbreak was thus averted.

**Spruce budworm,** *Choristoneura fumiferana* (Clem.). The year 1962 was the fifteenth consecutive one in which the spruce budworm has been epidemic in the fir forests of the northern Rocky Mountains. Infestations in 1962 spread to an additional 75,000 acres, and the total area of defoliation approximates 4,575,000 acres. The severity of defoliation in 1962 was variable, increasing in some areas and decreasing in others. Tree mortality, however, was much greater in 1962 than in 1961 even though the overall degree of defoliation was less. On the basis of egg mass sampling in affected stands, heavy defoliation is expected again in 1963. Approximately 452,000 acres were aerially sprayed in Montana during 1962. Additional spraying has been recommended.

**Douglas-fir tussock moth,** *Hemerocampa pseudotsugata* McD. Individual Douglas-firs, grand firs, and spruce trees growing in farm woodlots and around private homes in Clarks Ferry, Bonners Ferry, and Moscow, Idaho, were heavily defoliated by the tussock moth in 1961. During 1962, defoliation increased in Clarks Ferry and Bonners Ferry and infestations spread to Copeland, and Moyie, Idaho. New infestations also were discovered in Coeur d'Alene and Hayden Lake, Idaho, and near Colbert, Wash. Damage to trees was most severe in the latter area. Control of infestations was undertaken by some individuals wishing to protect high-value trees.

**Larch casebearer,** *Coleophora laricella* (Hbn.). The first discovery of the larch casebearer in the West was near St. Maries, Idaho, in 1957. In each year since, infestations have worsened and spread. In 1961, defoliation of larch was visible from the air on 700 square miles. The area of infestation doubled in 1962 and was visible on 1,400 square miles. Vanguard infestations extend to St. Regis and Thompson Falls, Mont., north to Bonners Ferry, Idaho, and northwest to Springdale, Wash. The infestation is expected to continue its spread throughout the larch stands in Idaho, Montana, and Washington.



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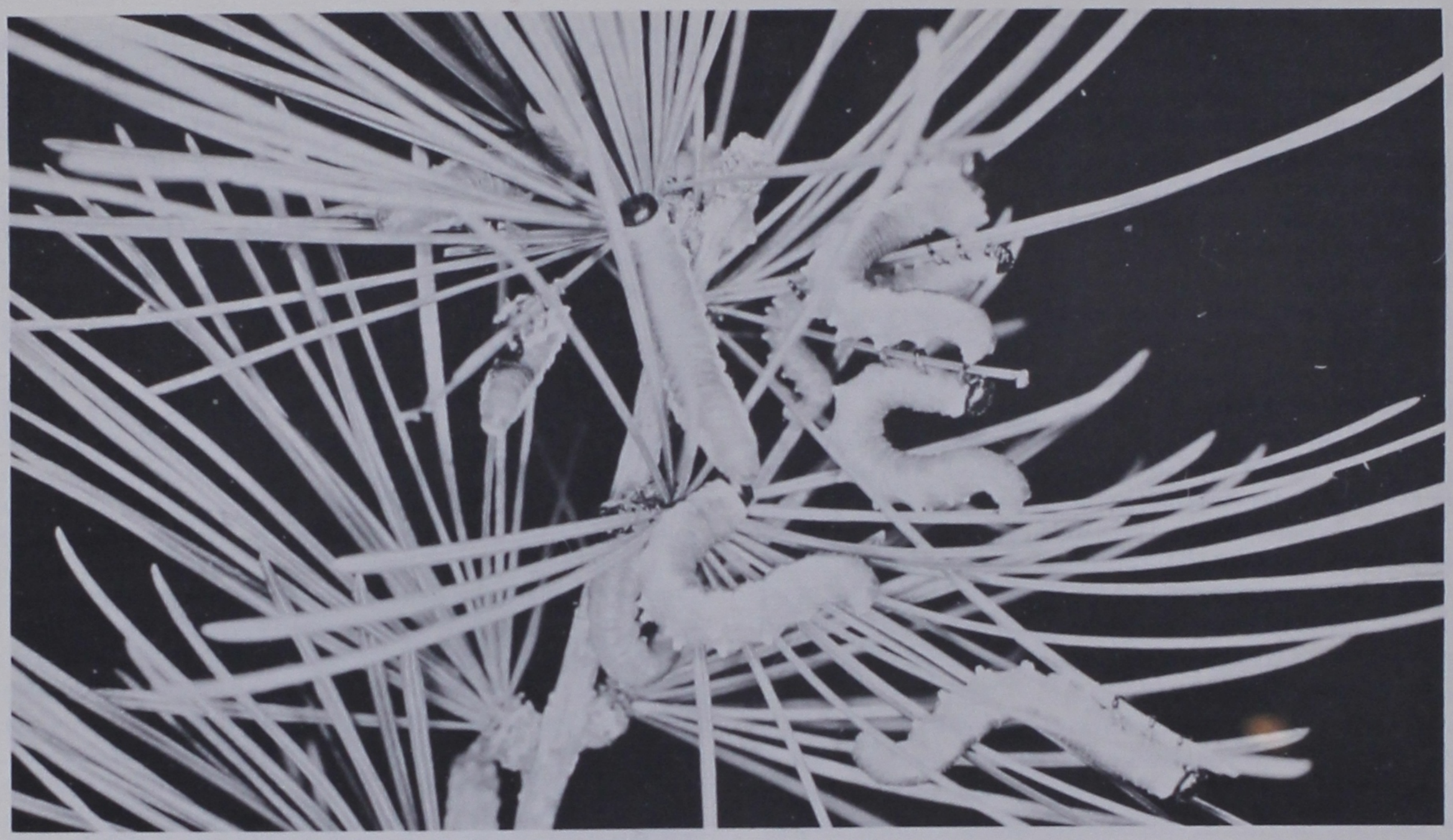
Spruce budworm has been epidemic in the fir forests of the northern Rocky Mountains for 15 consecutive years. Picture shows larvae in the 6th instar.



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Larch sawfly larvae severely defoliated western larch on portions of the St. Joe National Forest, and at other locations in Idaho.

Recovery of progeny of the Braconid parasite, *Agathis pumilus* (Ratz.), from the site of liberation near St. Maries points to possible establishment of the parasite in Idaho. Its liberation in other areas of the infestation is planned. The effectiveness of malathion for control of the casebearer was tested in 1962 with favorable results.

**Douglas-fir needle midges,** *Contarinia* spp. Two species of needle midges, *C. pseudotsugae* Condr., and *C. constricta* Condr., often are found infesting the same host tree in north Idaho. The damage they have caused to Douglas-fir has been increasing steadily since 1957. In 1962 heavy populations occurred in all Douglas-fir stands along the South, Middle, and North Forks of the Clearwater River in Idaho. Heavy infestations also were noted in several areas in western Montana. Damage in the latter area has seriously curtailed harvesting the young growth for Christmas trees.

**Pine needle sheath miner,** *Zelleria haimbachi* Busck. This sheath miner caused light defoliation in most lodgepole and ponderosa pine stands from central Montana to Idaho. Moderate defoliation on some 4,000 acres of lodgepole pine in Truman Gulch, Gallatin National Forest, developed from a light infestation on but 500 acres in that area in 1960.

**Pine needle scale,** *Phenacaspis pinifoliae* (Fitch). The pine needle scale is primarily a pest of ornamental trees in north Idaho and Montana, but at times it is damaging to trees in forest stands, particularly along the edges of dusty roads. In 1962, approximately 1,200 acres of lodgepole pine were heavily infested in Glacier National Park, Mont. Many sapling-size trees were killed and foliage on others turned yellow. Malathion will be used to control the infestation during the spring months.

**Larch sawfly,** *Pristophora erichsonii* (Htg.). The larch sawfly is generally distributed throughout stands of western larch in most of north Idaho and Montana. In most years, as in 1962, host trees are only lightly defoliated. Heavier than usual defoliation, however, occurred on about 1,200 acres in the Olsen Creek Drainage, St. Joe National Forest, and in the Little North Fork of the Clearwater Drainage, and north of Headquarters, Idaho. Chronic infestations continued in the area between the Blackfoot and Clearwater Rivers in Montana.

**Pine butterfly,** *Neophasia menapia* Feld. There were many reports that large numbers of pine butterflies were seen in flight in stands of western white pine and ponderosa pine in parts of Idaho, and in a stand of lodgepole pine in Montana. Damage to host trees was not observed.

**Lodgepole needle miner,** "*Recurvaria*" *milleri* Busck. The largest known infestation of the needle miner ever known in Montana occurred in 1962 in an area south of Butte. The infestation was very heavy on about 3,000 acres. Moth flight in Montana occurs on even-numbered years; thus, adult emergence will not occur until 1964.

**Pine sawflies,** *Neodiprion spp.* Two species of sawflies, *N. contortae* Ross, and *N. fulviceps* complex, have fed heavily on the foliage of their separate hosts, lodgepole pine and ponderosa pine, respectively, in the Little Rockies, Lewis and Clark National Forest, Mont., for the past several years. Beginning in 1961, populations of both species were drastically reduced by a polyhedrosis virus and defoliation in 1962 was practically nil.

**Other insects.** Egg masses of the rusty tussock moth, *Orgyia antiqua* (L.), were found on Douglas-fir trees in quite a large area near Olney, Mont. Egg masses were also found in subalpine fir near Kalispell, and on Engelmann spruce in the north Flathead River Drainage, Mont. The likelihood of an outbreak is not known. The balsam-fir sawfly, *Neodiprion abietis* (Harr.), was reported feeding on Douglas-fir at Rathdrum Prairie, Idaho. A bark weevil, *Pissodes curriei* Hopk., attacked the root collars of small western white pines in Glacier National Park, Mont. The western larch roundheaded borer, *Tetropium velutinum* LeC., attacked weakened overmature larch at two locations in Montana—in the South Fork Flathead River Area, and the Mormon Creek Drainage, Lolo National Forest.

# INTERMOUNTAIN STATES

*By* R. I. Washburn, Division of Timber Management, Ogden, Utah

## Conditions in Brief

The forests of the Intermountain States were faced with a great variety of serious forest insect infestations. Over 30 different kinds of insects were epidemic or showed a definite trend toward increasing. The most important problems were the mountain pine beetle, spruce budworm, aspen leaf tier, pinyon needle scale, and Douglas-fir beetle. The mountain pine beetle continued to be particularly destructive in the lodgepole pine stands of northern Utah, western Wyoming and southern Idaho. The Douglas-fir beetle killed large volumes of Douglas-fir in Utah and Idaho.

Infestations of the spruce budworm increased in severity and expanded in the Douglas-fir and true fir forests of southern Idaho. A leaf tier was epidemic in many aspen stands throughout the Region. Pinyon needle scale was widespread in stands of pinyon pine in southwestern Utah and most of Nevada. The Engelmann spruce beetle was epidemic in two areas—one in southern Utah and the other in western Wyoming. The fir engravers were active and damaging to true firs in Utah and Idaho.

There were localized outbreaks of tussock moths, sawflys, leaf and needle miners, tube moths, mealybugs, tent caterpillars, and miscellaneous bark beetles on preferred host trees at many locations in all States.

## Status of Insects

**Mountain pine beetle,** *Dendroctonus monticolae* Hopk. In general, the mountain pine beetle was extremely aggressive throughout the lodgepole pine forests in the Intermountain States. Control projects significantly reduced the number of infested trees, in spite of the fact that the beetles had a tendency to more than double their own number. Control work will need to be continued to further reduce wholesale tree killing over extensive areas.

There were three major control projects in 1962—on the Wasatch National Forest, Utah; Teton National Forest, Wyo.; and Targhee National Forest, Idaho. Infested trees were logged, treated with toxic chemicals, or burned. Over 1.5 million board feet of infested trees were logged on and near the Targhee National Forest. In addition, nearly 15 million board feet of infested timber was sold and will be logged early in 1963. State, private, and Federal land managers are cooperating to suppress a relatively new outbreak in lodgepole pine near McCall, Idaho.

**Spruce budworm,** *Choristoneura fumiferana* (Clem.). A spruce budworm infestation in southern Idaho has increased in scope and severity each year since 1958. The 1962 infestation covered a total of over 1.6 million acres of Douglas-fir and true fir timber. Damage levels increased. Forty-eight percent of the area had heavy defoliation and 23 percent medium defoliation. About one-third of the total infested area has been heavily defoliated for at least 2 years. Reproduction losses, although spotty, are plainly evident throughout the areas that have suffered heavy defoliation. Mature trees in the areas of repeated heavy defoliation are not expected to withstand another year of nearly complete defoliation. The increasing trend of the spruce budworm infestations is expected to continue unless populations are reduced by direct means.

**Aspen leaf tier.** A leaf tier, identified as *Sciaphila duplex* (Wlsh.), was epidemic in aspen stands in Utah and western Wyoming. The infestations covered over 300,000 acres and occurred in commercial stands, recreation areas, and game ranges. Defoliation exceeded 50 percent on about 75 percent of the areas. Many trees were killed in areas which had been defoliated for 2 consecutive years. In two infestation centers the large aspen tortrix, *Choristoneura conflictana* (Wlk.), was also present in epidemic number. In general, it is expected that the leaf tier infestations will increase in size, and that defoliation will equal or exceed that experienced in 1962. Tree killing may be widespread.

**Pinyon needle scale,** *Matsucoccus acalyptus* Herbert. The pinyon needle scale caused severe defoliation throughout most of the pinyon pine type of southwestern Utah and Nevada. The in-

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**Aspen defoliated by an aspen leaf tier, *Sciaphila duplex* (Wlsh.), Bridger National Forest, Wyo.**

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**Egg mass of an aspen leaf tier, *Sciaphila duplex* (Wlsh.), on bark of an aspen tree, Bridger National Forest, Wyo.**

festation is expected to persist, and to further defoliate affected trees.

**Douglas-fir beetle,** *Dendroctonus pseudotsugae* Hopk. Damage caused by the Douglas-fir beetle was heaviest on the National Forests of southern Utah and southern Idaho. Douglas-fir stands on the Dixie National Forest, Utah, and Sawtooth National Forest, Idaho, were particularly hard hit. Tree killing in most areas is expected to continue at the same high level in 1963. On the Sublette Division, Sawtooth National Forest, a large commercial sale is in operation, with the intent of salvaging infested trees and utilizing the host material.

**Engelmann spruce beetle,** *Dendroctonus engelmanni* Hopk. There were two large centers of Engelmann spruce beetle activity in the Intermountain States—one in southern Utah on the Dixie National Forest, and the other in the Upper Green River area, Bridger National Forest, Wyo. The latter has been active for a number of years. The Dixie infestation was detected in the fall months and is being logged. Unmerchantable material will be treated with a toxic chemical. Only limited cleanup should be needed next year. An all-out suppression effort was directed against the Upper Green River infestation. Over 63,000 infested trees were treated with toxic chemicals. The combined effect of chemical treatment, woodpecker activity, and a light flight should eliminate the need for more than incidental cleanup next year.

For the last 3 years, there has been a slow but steady increase in spruce beetle activity on the Teton National Forest, Wyo., Fishlake National Forest, Utah, and Payette National Forest, Idaho.

**Great basin tent caterpillar,** *Malacosoma fragile* (Stretch). Serious defoliation of aspen, cottonwoods, and several herbaceous plants occurred along the Virgin River and in other localized areas in southern Utah. *Bacillus thuringiensis* Berliner, was effective for controlling the tent caterpillar in Zion National Park. Bitterbrush was the preferred host for this insect in western Wyoming. Heavy epidemic populations were present near the Jackson airport in Grand Teton National Park. Epidemic conditions are expected again next year in both southern Utah and western Wyoming.

**Tussock moths,** *Orgyia* spp. Outbreaks of tussock moth occurred on four different hosts in four distinct localities. Ponderosa pine seedlings and brush species in Boise Basin, Boise National Forest, Idaho, have been severely defoliated by the tussock moth larvae since 1959. Populations this year decreased sharply, primarily because of infection by a native polyhedral virus. About 11,000 acres of Douglas-fir on the Boise National Forest, Idaho, were infested with epidemic numbers of tussock moths, and nearly half of the area was heavily defoliated. The infestation is relatively new and expected to increase in area and severity. An infestation in the white fir stands of the Humboldt National Forest in northern Nevada extended over 60,000 acres. Tussock moth larval populations were heavy early in 1962, but relatively few survived to the adult stage. Consequently, damage is not expected to be severe next year. In 1959 a virus was applied to a tussock moth infestation on bitterbrush near Reno, Nev., and the population was reduced to a low level. Egg masses were plentiful again this year, and damage is expected to increase next year.

**Mealybugs,** *Puto* spp. The mealybug, *Puto cupressi* (Coleman), has been epidemic since 1958 on the Payette National Forest, Idaho. The infestation persisted for 2 or 3 years and then nearly disappeared, only to reappear in another location a short distance away. The present infestation covers about 500 acres in Big Dave Creek north of McCall, Idaho. Hosts are alpine fir, white bark pine, and Englemann spruce. No tree mortality has occurred and no practical control measures are known.

Populations of a spruce mealybug, *Puto* sp., continued at epidemic levels within Engelmann spruce stands in southern Utah. The infestations occur in three separate areas totaling approximately 60,000 acres. Noticeable limb killing occurred in one area in 1962. Mortality of Engelmann spruce reproduction is common within the older infestations.

**Aspen leaf miner,** *Phyllocnistis populiella* Chamb. This leaf miner persisted at epidemic levels throughout southeastern Idaho and western Wyoming. Considerable tree deformity and mortality has occurred in the past few years. Increased activity of this pest was noted in Utah during 1962. No control measures have been attempted.

**Lodgepole needle miner,** "*Recurvaria*" *milleri* Busck. The lodgepole needle miner continued as a serious forest pest in the Intermountain States. Over 200,000 acres of lodgepole pine were affected in Idaho, Wyoming, and Utah. On the Targhee National Forest, the heaviest defoliation occurred around Island Park Reservoir, north of St. Anthony, Idaho. In other areas, defoliation remained at about same level as in 1961.

**Tube moth,** *Argyrotaenia* sp. Populations of a pine tube moth continued at epidemic levels within lodgepole pine stands on the Targhee National Forest, Idaho. The infestation was most severe in reproduction and young trees on cutover areas. The total areas of infestation increased only slightly from last year's estimate of 100,000 acres. Fluctuations of population levels were evident but, in general, the infestation is expected to continue at an epidemic level through next year. No effort was made to reduce populations by direct means.

**Fall and spring cankerworms.** An epidemic outbreak of fall and spring cankerworms, *Alsophila pometaria* (Harris) and *Paleacrita vernata* (Peck), occurred on the Wasatch National Forest in Mill Creek Canyon just east of Salt Lake City. Boxelder, maple, and mountain ash have been severely defoliated for 2 consecutive years. Heavy defoliation occurred in southeast Salt Lake City immediately adjacent to Mill Creek Canyon. Epidemic populations are expected to be present again next year.

**Fir engraver,** *Scolytus ventralis* LeC., and **western balsam bark beetle,** *Dryocoetes confusus* Sw. Many thousands of true fir trees have been killed by these beetles throughout the Intermountain States during the past few years. Infestations vary from a few acres in size to hundreds of acres. The majority of the affected stands are in rather inaccessible areas and have relatively low economic value. Thus, control of infestations is rarely undertaken except in high-value recreation areas.

**Other insects.** *Ips* sp. were active in local areas of pinyon pine in eastern Utah and ponderosa pine in southern Idaho. Ambrosia beetles attacked aspen trees in excelsior sale areas in southern Utah. Damage caused by female cicada oviposition wounds was severe in pinyon pine Christmas tree production areas near Carson City, Nev. Scales and aphids were abundant on both conifers and deciduous trees throughout the Intermountain States. Populations of pandora moth, sawflys, and Black Hills beetle were at a low level in 1962.

## CENTRAL ROCKY MOUNTAINS

*By* the Division of Timber Management, Rocky Mountain Region, Denver, Colorado

### Conditions in Brief

The Black Hills beetle was the most important forest insect in the central Rocky Mountains and infestations of serious proportions occurred on the Pike and San Isabel National Forests, Colo., the northern Black Hills, S. Dak., and the Bighorn Mountains, Wyo. Mountain pine beetle infestations increased on the Shoshone National Forest, Wyo. The Engelmann spruce beetle was less of a problem than in prior years, but a serious infestation continued in the vicinity of Wolf Creek Pass, southern Colorado. The scope and severity of

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**Adult and larval galleries of the fir engraver, *Scolytus ventralis* LeC., Dixie National Forest, Utah.**

spruce budworm infestations in Colorado declined. Damage by the pandora moth was moderate on parts of the Medicine Bow, Roosevelt, and Routt National Forests, and is expected to increase in 1963.

Federal and State agencies made a major effort in 1962 to suppress insect outbreaks in the central Rockies and check the losses caused by them. To the extent possible, bark beetles were suppressed by logging infested trees and the use of trap trees. Unusually cold temperatures aided in controlling the Black Hills beetle along the Front Range of the Rockies. Spruce budworm infestations in southern Colorado were suppressed by aerial application of DDT.

## Status of Insects

**Black Hills beetle,** *Dendroctonus ponderosae* Hopk. Five outbreaks of the Black Hills beetle occurred in stands of ponderosa pine in the central Rocky Mountains. On the Pike National Forest, near Lake George, Colo., approximately 96,120 trees were killed on 38,160 acres. In the northern Black Hills, near Deadwood, S. Dak., some 20,680 trees were killed—a greater number than in 1961. Populations remained high in the Bighorn Mountains in Wyoming; in the north Powderhorn area, near Gunnison, Colo.; and in an area southwest of Pueblo, Colo. Federal and State agencies plan to suppress the outbreaks in all affected areas.

**Mountain pine beetle,** *Dendroctonus monticolae* Hopk. The mountain pine beetle remained a serious problem in stands of lodgepole pine near Dubois, Wyo., where approximately 19,000 trees were killed. Plans are being made to suppress the outbreak.

**Engelmann spruce beetle,** *Dendroctonus engelmanni* Hopk. The Engelmann spruce beetle was less of a problem in the central Rocky Mountains than in 1961. However, infestations of significance occurred at two locations and each will need to be suppressed to prevent intensification of tree killing and spread. The most serious problem was on the San Juan National Forest, south of Rico, Colo. There, several thousand overmature spruce trees were blown down by severe winds in October 1961. These down trees have since become infested and the emerging population poses a threat to standing green trees. The infestation on the San Juan and Rio Grande National Forests, in the vicinity of Wolf Creek Pass, southern Colorado, remained at a high level.

The timely cutting of green spruce trees to trap the Engelmann spruce beetle is being used extensively to control infestations in affected areas. Chemical sprays and the logging of infested trees also are used, as needed, to supplement control achieved by trapping.

**Spruce budworm,** *Choristoneura fumiferana* (Clem.). A reversal occurred in the trend of spruce budworm infestations in the mixed conifer forests in Colorado. Instead of the increase in acreage and severity of infestations noted in 1961 and prior years, a decline in scope and intensity of defoliation occurred in 1962. On the basis of budworm egg mass surveys in affected areas, the downward trend of infestations is expected to continue in 1963.

Two spruce budworm outbreaks in southern Colorado were successfully controlled in June 1962. The largest, on the Rio Grande National Forest, involved aerial spraying on 84,285 acres. The other, encompassing but 600 acres, was in the vicinity of Ouray, Grand Mesa-Uncompahgre National Forests. Fixed-wing aircraft and helicopters were used in the spray programs. The latter were used to spray infested areas adjacent to streams so as to minimize possible adverse effects to fish and fish food organisms.

**Pandora moth,** *Coloradia pandora* Blake. An infestation of pandora moth has persisted in stands of lodgepole pine along the Colorado-Wyoming border for the past several years. Defoliation by first-year larvae in 1961 was not severe, but it was heavy enough to be visible from low-flying aircraft on some 36,000 acres. Defoliation by the second-year larvae in 1962 was not reported as severe. However, a heavy moth flight was

noted in August, with moths attracted to lights in towns far distant from known infestation centers. Overwintering larvae are numerous, and heavy defoliation is expected in 1963.

**Oregon pine ips,** *Ips oregonis* (Eichh.). A sharp decline occurred in populations of the Oregon pine ips in the Black Hills of South Dakota and Wyoming. The decline is attributed to above average precipitation in 1962, the second wettest year on record. It is predicted that the insects will cause little or no damage in the Black Hills during 1963.

**Douglas-fir beetle,** *Dendroctonus pseudotsugae* Hopk. Douglas-fir beetle infestations were at low endemic levels in all but one location in stands of Douglas-fir in the central Rocky Mountains. The single exception was an outbreak in the north Powderhorn area, southwest of Gunnison, Colo., where some 5,560 trees were killed.

**Western balsam bark beetle,** *Dryocoetes confusus* Sw. This bark beetle, at times a serious pest of subalpine fir in Colorado and Wyoming, was endemic in 1962.

**Great basin tent caterpillar,** *Malacosoma fragile* (Stretch). For a decade or more, this defoliator occurred in outbreak numbers throughout the stands of aspen in southern Colorado. Beginning in 1958, populations were materially reduced by natural control factors and infestations began to wane. The downward trend in infestations continued in subsequent years, and in 1962 only light defoliation at scattered locations was reported.

**Large aspen tortrix,** *Choristoneura conflictana* (Wlk.). At periodic intervals, the large aspen tortrix occurs in outbreak numbers in stands of aspen throughout southern Colorado. The last reported outbreak was in 1958, at which time some 220,000 acres were affected. Infestations were noted again on the San Juan, Grand Mesa-Uncompahgre, and Gunnison National Forests during 1962. The intensity of defoliation increased in these forests during 1962, but in general, damage was light.

**Pine needle miner,** "*Recurvaria*" sp. An unidentified needle miner has caused light defoliation in stands of ponderosa pine at various places in Colorado for several years. In 1961 light defoliation was reported on several thousand acres in the southern part of the State. Damage in 1962 was less severe than in 1961 and was noticed only in one area, west of Durango.

## SOUTHWESTERN STATES[1]

*By* D. D. Lucht and G. E. Moore, Division of Timber Management, Albuquerque, New Mexico

[1] Includes all forested lands in Arizona and New Mexico and National Park Service land in southern Colorado and west Texas.

### Conditions in Brief

Several species of insects were damaging to the forest resources in the Southwest. The Engelmann spruce beetle killed large numbers of mature and overmature Engelmann spruce trees in northern New Mexico. Losses caused by the Douglas-fir beetle were severe in stands of Douglas-fir in parts of Arizona and New Mexico. The Arizona five-spined ips occurred in outbreak in second-growth ponderosa pine in central Arizona.

The severity of defoliation by the spruce budworm increased on some 920,000 acres of mixed conifer forest west of the Rio Grande River in northern New Mexico and northeastern Arizona. The Great Basin tent caterpillar decreased in numbers in stands of aspen on the Navajo Indian Reservation, Ariz., but increased on 100,000 acres in northern New Mexico. The pinyon needle scale caused severe damage to pinyon pine at Grand Canyon and Mesa Verde National Parks.

Cultural and chemical control projects were undertaken to suppress several epidemics. Efforts were highly successful in controlling the spruce budworm on approximately 445,000 acres of mixed conifer forests east of the Rio Grande River in northern New Mexico. Outbreaks of the Engelmann spruce beetle, also in northern New Mexico, were combated by timber sale, supplemented by burning cull logs and other logging debris, and by spraying trees with ethylene dibromide in fuel oil. Outbreaks of the fall webworm in three National Monuments were suppressed by helicopter application of DDT.

### Status of Insects

**Engelmann spruce beetle,** *Dendroctonus engelmanni* Hopk. Two major Engelmann spruce beetle outbreaks which have developed during the past several years continued in mature and overmature spruce stands in northern New Mexico. Outbreaks originated in logging debris in adjacent areas. Five new centers of beetle activity were noted—four in northern New Mexico and one near Flagstaff, Ariz.

The 4-year-old outbreak at the eastern boundary of the Tierra Amarilla Grant, northern New Mexico, caused localized tree mortality on the adjacent Carson National Forest. The 5-year outbreak on the Carson National Forest, (previously part of the Rio Grande Grant) near Taos, N. Mex., remained static. Efforts to suppress this outbreak by timber sale and burning of cull material continued. About 2,250 acres of slash and cull logs were burned in 1962, an eightfold increase over 1961.

Two of the new centers of infestation, near Canjilon Peak and Lagunitas Recreation Area, Carson National Forest, resulted from population buildup in cull logs in adjacent logging areas. The new center near Elk Mountain, Santa Fe National Forest, stemmed from blowdown in overmature spruce.

F—503788

**Severe blowdown in a stand of Engelmann spruce, Santa Fe National Forest, N. Mex. Engelmann spruce beetle often builds up to outbreak numbers in blowdown timber, and later emerges to attack and kill standing trees.**

The infestation on Tesuque Peak, Santa Fe National Forest, resulted from debris from road construction through the spruce type. Because of the threat posed by these latter infestations to high-use recreation and valuable watershed areas, about 2,500 brood-laden, down spruce stems were sprayed with ethylene dibromide in fuel oil.

The new center of beetle activity on the Coconino National Forest near Flagstaff, Ariz., resulted from recreational improvements at the Snowbowl Ski Area. Control of this infestation has been recommended.

**Spruce budworm,** *Choristoneura fumiferana* (Clem.). Successful control of the spruce budworm on 445,000 acres of mixed conifer forests east of the Rio Grande River in northern New Mexico in 1962, reduced the total acreage of infestations in the Southwest to 920,000 acres. On this acreage, in the western division of the Santa Fe and Carson National Forests, N. Mex., and on the Navajo Indian Reservation, Ariz., budworm populations remained static at a high level. On the basis of budworm egg mass counts, there is no indication of significant natural decline in population levels.

**Douglas-fir beetle,** *Dendroctonus pseudotsugae* Hopk. This insect persisted in damaging numbers throughout stands of Douglas-fir in Arizona and New Mexico. Tree killing was most serious on portions of the Santa Fe and Cibola National Forests, N. Mex., and the Kaibab National Forest, Ariz. An infestation of consequence also was reported on the Mt. Graham Recreational Area, Coronado National Forest, Ariz. To the extent possible, killed trees were logged as a means of control.

**Arizona five-spined ips,** *Ips lecontei* Sw. Slashings created from the sale of pole-size ponderosa pines on the Prescott National Forest, Ariz., were heavily attacked by the Arizona five-spined ips. Populations from the slash later attacked and killed some 300 second-growth trees in stands adjacent to the sale area.

**Fir engraver,** *Scolytus ventralis* LeC. A persistent infestation of the fir engraver in stands of white fir on Sandia Mountain, Cibola National Forest, N. Mex., began a natural decline in 1960.

The downward trend continued in 1961 and 1962. An infestation discovered on the Rim Unit of the Coconino National Forest, Ariz., in 1961, remained active.

**Douglas-fir tussock moth,** *Hemerocampa pseudotsugata* McD. A small outbreak of Douglas-fir tussock moth has occurred in white fir and Douglas-fir in a box canyon on Sandia Mountain, Cibola National Forest, N. Mex., for several years. During a ground check in the area in 1962, defoliation was observed but no insects were found. The infestation subsided from natural causes.

**Black hills beetle,** *Dendroctonus ponderosae* Hopk. An aggressive infestation of Black Hills beetle has attacked most of the remaining limber pine on the Mountainair District, Cibola National Forest, N. Mex. No control is planned unless the beetle attacks ponderosa pine at lower elevations in the area.

**Roundheaded pine beetle,** *Dendroctonus convexifrons* Hopk. An infestation of this bark beetle in ponderosa pine in the vicinity of Bonito Lake, Lincoln National Forest, N. Mex., continued at a high level. Efforts to suppress populations by spraying individual trees with ethylene dibromide were unsuccessful. The reasons for the failure are being investigated and additional control will be withheld until the studies are complete.

**Western balsam bark beetle,** *Dryocoetes confusus* Sw. The rate of tree killing by this bark beetle remained high in stands of corkbark and alpine fir in New Mexico. Tree mortality increased on the Santa Fe National Forest and was particularly severe on about 40,000 acres near Red River, Carson National Forest.

**Great basin tent caterpillar,** *Malacosoma fragile* (Stretch). Aspen stands on about 100,000 acres in northern New Mexico were severely defoliated. Those on the Navajo Indian Reservation, Ariz., also were defoliated, but not as severely as in the past few years. An increase in populations of the pest and resultant defoliation were noted at the North Rim, Grand Canyon National Park, and on the adjacent North Kaibab National Forest, Ariz.

**Pinyon needle scale,** *Matsucoccus acalyptus* Herbert. The pinyon needle scale continued to increase and spread at Mesa Verde National Park, Colo. An estimated 18,000 trees are now infested. Some trees under 5 feet in height have been killed. A heavy infestation remained static at Grand Canyon National Park, Ariz. Pilot control studies showed that 0.5 percent dimethoate is effective in controlling this insect.

**Fall webworm,** *Hyphantria cunea* (Drury). Defoliation by the fall webworm was moderate to severe on cottonwood at Aztec Ruins, Bandelier, and Chaco Canyon National Monuments, N. Mex. The webworm was controlled in these areas with DDT applied by helicopter.

**Nevada buck moth,** *Hemileuca nevadensis* Stretch. An isolated infestation of the Nevada buck moth occurred on cottonwoods at White Sands National Monument, N. Mex. The infestation was suppressed with DDT sprays.

F—503790

**Late instar larvae of the Great Basin tent caterpillar, *Malacosoma fragile* (Stretch), an important defoliator of aspen in the Southwest.**

**California five-spined ips,** *Ips confusus* (LeC.). An engraver infestation originating in cabled pinyon pine near Walnut Canyon National Monument, Ariz., in 1960 decreased and no longer poses a threat to pinyon stands in the Monument. No newly infested trees were found in 1962.

About 20 trees were attacked by this ips around the perimeter of the piled pinyon debris from a road improvement project at Grand Canyon National Monument, Ariz.

**Pine sawfly,** *Neodiprion* sp. A light sawfly infestation on ponderosa pine near Magdalena, N. Mex., died out. The infestation in the Zuni Mountains, about 80 miles northwest of Magdalena, persisted on about 1,200 acres. Damage to host trees was moderate.

# LAKE AND CENTRAL STATES

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## Conditions in Brief

Forest insect infestations in the Lake and Central States were less severe than during the past

[2] Information compiled from reports submitted by Professor E. G. Rennels, Illinois; Paul R. Flink, Michigan; Raymond Dolan, Gerald Beach, and Leo Abrahamsen, Minnesota; Ramon Gass, Missouri; M. K. Idleman, Ohio; D. W. Renlund, Wisconsin; and D. D. Lucht, A. C. Valcarce, and David McComb, Forest Service.

few years. The spruce budworm remained in outbreak in some stands of spruce and fir in many areas in northeastern Minnesota. The jack-pine budworm declined in stands of jack pine in the northern part of the Lake States and remained in outbreak only in southern Hubbard County, Minn. A new infestation of pine tussock moth was discovered in stands of jack pine in Crow Wing County, Minn., and in Marinette County Wis. Carryover infestations of the tussock moth also were reported in some stands adjacent to those sprayed for control during the summer months. Defoliation of oaks and hickories by cankerworms ranged from light to moderate in the northern part of Missouri but was severe in several localities in southern and west central Wisconsin, and along a portion of the Red River, Minn. Miscellaneous insects, such as pine shoot and tip moths, sawflies, weevils, spittlebugs, leaf rollers, and scales were damaging only in local areas.

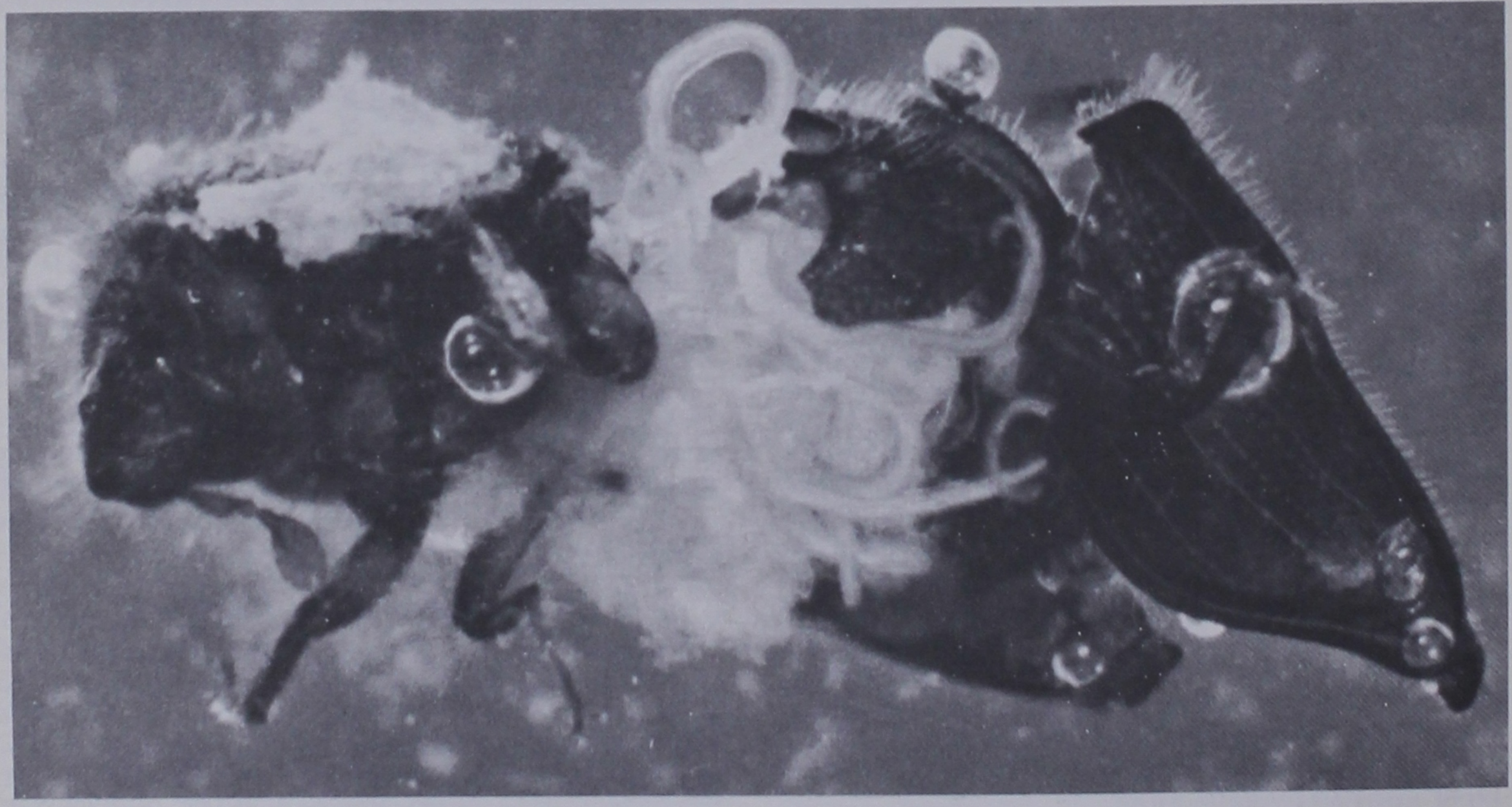
Efforts by public and private agencies to suppress forest insects in the Lake and Central States were directed primarily against the spruce budworm, jack-pine budworm, pine tussock moth, and Saratoga spittlebug. Approximately 57,000 acres of spruce-fir forests in northern Minnesota were sprayed to control the spruce budworm. The jack-pine budworm was controlled on 12,500 acres of jack pine on the Hiawatha National Forest, Upper Michigan, and on 25,000 acres of the Chippewa National Forest, Minn. Control of the pine tussock moth entailed spraying a total of approximately 26,100 acres—4,200 in Minnesota and 21,900 in Wisconsin. A total of 2,734 acres of red pine plantations in Michigan and Wisconsin were sprayed for control of Saratoga spittlebug.

## Status of Insects

**Spruce budworm,** *Choristoneura fumiferana* (Clem.). The long-standing outbreak of spruce budworm continued in the spruce-fir forests of northern Minnesota. However, there was no spread of infestations to the east and south, as in the past several years, and on the basis of egg-mass surveys during the summer months, populations are believed to be on the wane. It is estimated that approximately 600,000 gross acres are infested. Much of this area supports a relatively low percentage of susceptible host material, and infestations do not now pose a major threat to large volumes of the forest resource.

Budworm infestations were suppressed on approximately 57,000 acres during 1962 with excellent results. Control during 1963 has been recommended only in high-use recreational areas on the Superior National Forest, and in high-value commercial stands on a part of the Nett Lake Indian Reservation and adjacent State and private lands.

**Jack-pine budworm,** *Choristoneura pinus* Free. Infestations of jack-pine budworm were materially reduced by natural control factors in most jack-pine stands in the Lake States. Populations were high across the northern half of the three States as late as May and early June. By late June, however, their numbers had been dras-



F—503790

Adult *Ips confusus* infested with adult and larval forms of the nematode, *Aphelenchulus elongatus* Massey. This endoparasite is reported to reduce the egg-laying potential of infested ips females.

tically reduced by parasites and predators. Only one area was reported where populations remained in outbreak numbers—the Badoura District, southern Hubbard County, Minn.

Two areas of heavy infestation were sprayed for control during the year. Some 12,500 acres on the Hiawatha National Forest, Mich., and approximately 25,000 acres on the Chippewa National Forest, Minn., were treated and populations were reduced by 98 to 99 percent.

**Pine tussock moth,** *Dasychira plagiata* (Wlk.). Early in the spring of 1962 three infestations of pine tussock moth on approximately 26,100 acres of jack pine, red pine, and white spruce stands in parts of Minnesota and Wisconsin were sprayed from the air. Excellent results were obtained. During the summer, two new infestations were discovered—one in Marinette County, Wis., and the other in Crow Wing County, Minn. Light populations also were found in stands adjacent to those sprayed for control, indicating a possible extension of infestations in those areas. A favorable ratio of parasites and predators to the host insect was reported in sprayed areas. Natural factors may reduce the pest species and preclude the need for additional artificial control there.

**Pine tortoise scale,** *Tuomeyella numismaticum* (P. & M.). This scale insect caused severe damage to jack pines in parts of Polk County, Wis., the Rapid River District, Hiawatha National Forest, and the Stonington Peninsula, Mich. Infestations of lighter proportions also were reported at scattered locations throughout both States. Direct control of the scale was not attempted, but some of the heavily infested areas were clear cut to salvage the merchantable trees. Heavy infestations of *T. liriodendri* (Gmel.) occurred on scattered sapling-size tulip poplars at several locations on the Shawnee National Forest, Ill.

**Larch casebearer,** *Coleophora laricella* (Hbn.). Larch stands in many areas in Wisconsin were lightly defoliated by the larch casebearer. Observations on population densities in Langlade County indicated the insects had increased in numbers since 1961. The proportional increase does not portend a serious outbreak, however.

**White-pine weevil,** *Pissodes strobi* (Peck). Damage caused by the white-pine weevil was extensive in pine plantations in Upper and Lower Michigan. White pine, red pine, jack pine, and white spruce were affected, with an increase in the weeviling of leaders at several locations. Damage to host trees was less noticeable in Wisconsin and Minnesota. Infestations in the latter States were spotty, and populations were at lower levels than in 1961.

**Forest tent caterpillar,** *Malacosoma disstria* Hbn. The forest tent caterpillar was found in light numbers in most aspen and maple stands throughout the northern part of Lower Michigan. In other parts of the Lake States populations were at low levels. Larval and adult collections in Minnesota, however, indicated a slight increase over the population density occurring there in 1961.

The eastern tent caterpillar, *Malacosoma americana* (Fab.), was reported to have severely defoliated cherry throughout Lower Michigan.

**European pine shoot moth,** *Rhyacionia buoliana* (Schiff.). The European pine shoot moth was found widespread in pine plantations in Michigan and damage to host trees was severe at several locations. New infestations also were reported on parts of the Lower Michigan and Hiawatha National Forests. Populations along Lake Michigan in east central Wisconsin declined and resultant damage was less severe than in prior years. Spot infestations of damaging proportions were reported from several localities in the Central States.

The Nantucket pine tip moth, *Rhyacionia frustrana* (Comst.), occurred throughout the Central States. Population levels were below those in 1961, however, in natural and planted stands of shortleaf pine. Some areas heavily infested in 1961 were relatively free of infestations in 1962. Cause of the natural decline is not known.

**Saratoga spittlebug,** *Aphrophora saratogensis* (Fitch). There was an apparent decrease in spittlebug populations in susceptible pine plantations in Wisconsin and northwestern Michigan. In contrast, elsewhere in Michigan the level of populations and resultant damage to host trees was greater than in 1961. Adverse weather is believed to have caused the population decline in the northern areas.

Suppression of the spittlebug on Federal and non-Federal land resulted in the spraying of a total of 2,734 acres. A majority of the acreage sprayed was on national forest lands in Wisconsin and Michigan.

A local infestation of the pine spittlebug, *Aphrophora paralella* (Say), was reported affecting Scotch pine on the Munsing District of the Hiawatha National Forest in Upper Michigan. Damage to host trees was restricted to twig flagging and some mortality. Several localized infestations were reported from Illinois.

**Cankerworms,** *Paleacrita vernata* (Peck), and *Alsophia pometaria* (Harris). Spring and fall cankerworms were abundant on oaks and hickories in localized areas in southern and west central Wisconsin, along the Red River in Minnesota, and in the northern part of Missouri. Defoliation of host trees ranged from light to heavy, but refoliation of stripped trees, particularly in Wisconsin and Minnesota, began in June and recovery of the hosts was reported as good.

**Large aspen tortrix,** *Choristoneura conflictana* (Wlk.). The large aspen tortrix caused light to moderate defoliation of aspen on much of the Medford District, Chequamegon National Forest, Wis., and the Bergland District, Ottawa National Forest, Mich. Spotty defoliation also occurred

in parts of Prince and Rusk Counties, Wis., and in the east central part of the State.

**Pine sawflies,** *Diprion* and *Neodiprion* spp. On the whole, damage caused by pine sawflies was light in the Lake and Central States in 1962. *N. lecontei* (Fitch) was reported from scattered locations in Michigan, and in Emmet County 180 acres of jack pine plantations were sprayed from the air for control. The species also caused serious defoliation of roadside pine plantings in central and eastern Minnesota. The pest occurred infrequently in Wisconsin and in each of the Central States. *N. pratti banksianae* (Roh.) occurred in limited numbers in stands of jack pine infested by the jack-pine budworm on the Chippewa National Forest, Minn. *N. pratti pratti* (Dyar) occurred in outbreak on the Shawnee State Forest, Ohio, where it severely defoliated shortleaf pines. It was reported from only one location elsewhere—in Illinois. *N. taedae linearis* (Ross) defoliated Scotch and shortleaf pines in a limited area in southern Missouri. Near Ironton, Ohio, some 25 acres of a mixed pine plantation were stripped. *D. similis* (Htg.) was found in large numbers only at two locations in Minnesota. Elsewhere, infestations were at low levels. There was little evidence of *N. sertifer* (Geoff.) in the Lake and Central States, except in Illinois, where it was reported more frequently and in more places than in 1961. On the Henderson State Forest, Ill., heavy defoliation of red and Scotch pine occurred on some 350 acres.

**Larch sawfly,** *Pristiphora erichsonii* (Htg.). The larch sawfly was reported as abundant in stands of larch in St. Louis and Hubbard Counties, Minn. Elsewhere in the Lake States, infestations were noted, but resultant defoliation of host trees was less than in the previous few years.

**Pine chafer,** *Anomala oblivia* Horn. This chafer severely dofoliated jack pines in plantations in several counties in Lower Michigan. Some plantations were completely stripped. For the first time in several years, heavy infestations were reported from Montmorency County.

**Black turpentine beetle,** *Dendroctonus terebrans* (Oliv.). The black turpentine beetle was found at several locations in the Central States in and adjacent to stands cut or thinned. Light to moderate damage was reported in thinned and fire-damaged stands of shortleaf pines in south central Missouri. *D. valens* LeC. was reported damaging the residual stand in a thinning area on the St. Ignace District, Hiawatha National Forest, Mich.

**Ips (pine engravers),** *Ips* spp. A severe infestation of the pine engraver, *I. pini* (Say), was reported in a part of the Hiawatha National Forest, Mich., where pulpwood was cut the previous winter and left in piles along the roads over the summer. Similar conditions were observed on a part of the Lower Michigan National Forest, Mich. Scattered trees were killed in a thinned red pine plantation near Brownstown, Ind., and many shortleaf pines were killed in and adjacent to an area burned south of Salem, Mo. An unidentified species was reported as damaging to young red pines on the Cadillac District of the Lower Michigan National Forest.

**Other insects.** The fall webworm, *Hyphantria cunea* (Drury), was widespread in Missouri, Illinois, Indiana, and Ohio. Open-grown hickory and persimmon trees were more severely defoliated than other susceptible species in the stands. Heavy infestations of the locust leaf miner, *Xenochalepus dorsalis* (Thunb.), were reported throughout most of Ohio. The locust borer, *Megacyllene robiniae* (Forst.), was damaging at several locations on the Wayne-Hoosier National Forest and in an area near Jonesboro, Ill.

The elm leaf beetle, *Galerucella xanthomelaena* (Schr.), caused great damage to elms throughout Missouri and elsewhere in the Central States. Heavy infestations of an unknown pitch blister moth, *Petrova* sp., occurred on several square miles of jack pine stands on the Stonington Peninsula, Mich. Defoliation of oaks in Marinette County, Wis., by the walkingstick, *Diapheromera femorata* (Say), was less in degree and extent than in 1961. However, one infestation on the East Tawas District, Huron National Forest, severely defoliated oaks and other hardwods. Several red pine plantations in and near Wexford County, Mich., were severely damaged by the pine root collar weevil, *Hylobius radicis* (Buch.). An unidentified bark beetle attacking as much as 90 percent of the branch tips of jack and Scotch pines was reported from an area near Alpena, Mich.

The shoot borer, *Eucosma sonoma* (Kearf.), occurred extensively in western Upper Michigan and on the Stonington Peninsula and in Crawford County, Lower Michigan. Light to heavy infestations of the carpenterworm, *Prionoxystus robiniae* (Peck), were reported from many locations in the Central States. Heaviest infestations were in oak stands on ridgetops or on westerly and southerly exposures in southern and southeastern Missouri. The Zimmerman pine moth, *Dioryctria zimmermani* (Grote), killed about 20 percent of sapling-size shortleaf pines in a 20-acre plantation on the Cassville District, Mark Twain National Forest, Mo. Elsewhere in Missouri, and in Ohio, infestations were very light. Infestations of the bagworm, *Thyridopteryx ephemeraeformis* (Haw.), were reported widespread but of low incidence throughout the Central States.

## SOUTHERN STATES

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[3] Report compiled from information submitted by W. D. Buchanan, Dale VanDenburg, David Ketcham, and by the Georgia Forestry Commission.

## Conditions in Brief

Epidemic populations of the southern pine beetle caused heavy losses in Alabama, Georgia, Mississippi, North Carolina, South Carolina, and Texas. Major efforts to suppress these outbreaks are planned or underway on the National Forests and on private lands in cooperation with the States. Approximately 1,600,000 infested trees will be salvaged or sprayed with toxic oils. Black turpentine beetle activity generally decreased in the South. Exceptions occur in the naval stores areas of Georgia, Florida, and Mississippi. Tree killing by ips beetles was general throughout the South. Buildups were most noticeable, however, in areas of extreme drought.

The elm spanworm defoliated hardwoods in parts of north Georgia, southwestern North Carolina, and southeastern Tennessee for the ninth consecutive year. Infestations appeared for the first time in western South Carolina. In general, defoliation was less severe in 1962 than in 1961. The forest tent caterpillar defoliated large areas of water tupelo, sweet gum, and other bottom-land hardwood in Louisiana and Alabama. Large areas of bitter pecans were defoliated by a pecan worm in the bottom lands east of Alexandria, La.

The balsam woolly aphid continued to be a major cause of Fraser fir mortality on Mt. Mitchell State Park, N.C., and was found for the first time on Roan Mountain.

## Status of Insects

**Southern pine beetle,** *Dendroctonus frontalis* Zimm. The southern pine beetle epidemic in east Texas apparently reached a peak during July. The epidemic area grew from 600,000 acres at the end of 1961 to an estimated 4,500,000 acres by mid-June 1962. There was a noticeable decline in spread of the beetle during the latter part of July possibly because of unusually high temperatures or a heavy infestation of predacious mites. Aerial and ground observations during November showed a continued decline in beetle populations.

In Alabama, southern pine beetle infestations were centered on the Talladega National Forest. Aerial surveys in September revealed approximately 50,000 infested trees. Infestations of severe proportions also occurred during the summer on the Homochitto National Forest, Miss. Explosive populations were found during the year in the Piedmont areas of Georgia and North and South Carolina. The Georgia Forestry Commission has removed and treated approximately 400,000 infested trees since mid-March. Through prompt and agressive action, the Commission reduced the beetle below epidemic proportions in 20 of 26 counties designated as critical. A stepped-up control program during the winter months is being stressed, with the objective of removing all known infested trees before beetle emergence in early spring.

As a result of cooperative aerial detection surveys in early fall, an estimated 200,000 infested trees were found in 7 counties in North Carolina. Similar surveys conducted in South Carolina revealed an estimated 346,000 infested trees within a 19 county area. Control programs are scheduled for the two States. Southern pine beetle control programs are also active on the Sumter and Francis Marion National Forests, S.C., and on the Chattahoochee National Forest in north Georgia.

**Black turpentine beetle,** *Dendroctonus terebrans* (Oliv.). In the naval stores area of north Florida, south Georgia, and Mississippi, the black turpentine beetle was on the increase in 1962. Losses from this insect were the greatest reported since the drought of the 1950's in the Georgia-Florida area. Unless climatic and environmental factors change drastically during the winter, a continued upward trend in population density is expected.

In the remaining part of the Southern States, this pest was at a relatively low level through July, with some general increase in activity during the latter part of the season. The black turpentine beetle causes extensive losses throughout the pine belt of the Southern States each year.

**Ips (pine engravers)** *Ips* spp. Ips activity increased during the summer and populations were very aggressive in parts of Texas, Arkansas, Louisiana, Mississippi, and Alabama. Extreme drought conditions in many areas contributed to the buildup. Attacks were found to precede southern pine beetle activity on the Texas National Forest by as much as 2 weeks. In North and South Carolina, *I. calligraphus* Germ., and *I. avulsus* Eichh. were commonly associated in trees attacked by southern pine beetle and black turpentine beetle. Ips buildup was particularly noticeable along the southern boundary of the southern pine beetle outbreak areas in the Piedmont section of the Carolinas.

**Reproduction weevils.** A weevil, tentatively identified as *Pissodes nemorensis* Germ., was reported by the Georgia Extension Service to be damaging slash and longleaf pine stands in Tift, Crisp, Wilcox, and Coffee Counties, Ga. Young trees were most commonly attacked, but infestations in mature stands were not uncommon. This insect was also reported infesting young loblolly pine plantations near Aimwell, La. Trees were girdled by larvae feeding in the inner bark near the ground level. Similar damage was reported in several areas in northern Louisiana. The pales weevil, *Hylobius pales* (Herbst), was reported active in recently cut pine areas throughout the State of Arkansas. Weevil damage, affecting 3,000 acres of 1 to 4 year pines, was reported in late November near Bolton, N.C.

**Pine sawflies,** *Neodiprion* spp. Pine sawflies, although not a serious problem, were more common in 1962 than in 1961. The red-headed pine sawfly, *N. lecontei* (Fitch), was active in Arkansas,

F—503858

**Toxic oils were used to control the southern pine beetle in stands of southern pines in the Big Thicket area, east Texas. Treated trees were later salvaged from all accessible areas.**

F—471056

**Merchantable logs from trees killed by the southern pine beetle were salvaged and milled at many locations in the Southern States.**

Louisiana, Tennessee, North Carolina, and Florida. The largest area affected was reported in Lawrence County, Tenn., where several thousand acres of 3 to 4 year loblolly pines were defoliated, with tree mortality ranging up to 75 percent in some plantations. There were also 1,000 acres of pines reported defoliated near Merryville, La.

The Virginia pine sawfly, *Neodiprion pratti pratti* (Dyar), continued to decline in North Carolina, although some defoliation was noticeable. Scattered infestations of *N. excitans* Roh. were reported in eastern Texas, Florida, and Georgia. The Arkansas Agricultural Extension Service reported that *N. taedae linearis* Ross, was heavier and more widespread in central and eastern Arkansas in 1962 than at any time during the past years.

**Balsam woolly aphid,** *Chermes piceae* (Ratz.). Fraser fir mortality continued at an ever-increasing rate in the Black Mountains of North Carolina due to infestations of balsam woolly aphid. An extension of the infestation was discovered in 1962 on Roan Mountain along the North Carolina-Tennessee State line. Only five trees were found infested on Roan Mountain, but examination of radial growth indicated the aphid had been present for 4 years. It is unlikely that these are the only infested trees. The aphid was also detected in a new location on planted fir in Burke County, N.C.

**Elm spanworm,** *Ennomos subsignarius* (Hbn.). The elm spanworm continued to spread northward and eastward in 1962. Some defoliation of hardwoods was observed for the first time in South Carolina and in sections of the Great Smoky Mountains National Park, N.C. The heaviest damage occurred in Graham and Macon Counties, N.C., and Rabun County, Ga. Infestations declined in parts of Georgia and Tennessee. The total area infested in 1962 was reduced approximately 5 percent over that in 1961. Complete defoliation during the current year was limited to black walnut, hickory, and northern red oak in most instances. Egg mass surveys are scheduled to determine the trend of the infestation for 1963.

Elm spanworm infestations were suppressed on a total of 12,430 acres of high-value recreation and research areas on the Joyce Kilmer Memorial Forest and the Coweeta Hydrological Laboratory, N.C., and on the Chattahoochee National Forest, Ga. Control areas were sprayed with one-half pound of DDT in one gallon of fuel oil per acre, by helicopter.

**Forest tent caterpillar,** *Malacosoma disstria* (Hbn.). Surveys were conducted in May over 235,000 acres of bottom-land hardwoods along the Alabama, Tombigbee, and Mobile Rivers in southern Alabama. Of this area, 12,000 acres were heavily defoliated and an additional 48,000 acres lightly defoliated, compared with 200,000 acres affected by the insect in 1961. Damage by the caterpillar was also less extensive in southeastern Louisiana than last year. Cooperative aerial surveys in April 1962, with the Louisiana Forestry Commission over 1.5 million acres, showed that 169,000 acres had been heavily defoliated and that an additional 263,000 acres had been lightly defoliated. In 1961 approximately 1.5 million acres were defoliated by the forest tent caterpillar in the State. Primary species defoliated in the two-State area were water tupelo and sweetgum. This insect has been active in the State for several years.

**Pine colaspis,** *Maecolaspis pini* (Barber) Needle feeding on seedling and sapling slash pine by adults was more widespread and intense this year than in the past several years. Peak feeding and damage occurred about June 18. The infestation extended from Bartow, Fla., north to Savannah, Ga., and west to Marianna, Fla.

**Walkingstick,** *Diapheromera femorata* (Say). An estimated 25,000 acres were defoliated by the walkingstick in the Ouachita Mountains in Arkansas and Oklahoma. Although black oaks were the heaviest hit, white oak and other species were attacked. This insect has been active in the area for several years.

**Other insects.** A pecan worm, *Catocala agrippina* Stkr., defoliated large areas of bitter pecan in bottom lands east of Alexandria, La. The fall webworm, *Hyphantria cunea* (Drury), was common on hardwoods throughout most of the Region. Leaf feeding by adults of *Systena marginalis* (Ill.) occurred on pond cypress over Florida and south Georgia. A cone moth, *Dioryctria* sp., was reported from Dare County, N.C., causing dieback of tips in stands of pond pines. This insect was also reported affecting longleaf pine cones and tips in areas near Alexandria, La. A pine tip moth, *Rhyacionia frustrana* (Comst.), was reported present throughout the pine-growing area, with local areas of heavy infestations.

## NORTHEASTERN STATES

*By* JAMES L. BEAN, Division of State and Private Forestry, Forest Pest Control Branch, Upper Darby, Pennsylvania

### Conditions in Brief

The major forest insects in the Northeastern States caused serious losses to the forest resources. The spruce budworm epidemic in Maine intensified and will require a large scale control program in 1963 to prevent further top-killing and tree mortality. Gypsy moth infestations continued to increase in several locations, especially in New York and Massachusetts. Heavy winter kill of the balsam woolly aphid reduced populations throughout most of New England, but a buildup is expected. Some of the minor hardwood and softwood defoliators were quite abundant in several locations, with further increases expected in 1963.

### Status of Insects

**Spruce budworm,** *Choristoneura fumiferana* (Clem.). The spruce budworm reached epidemic proportions over extensive areas of spruce-fir forests in northeastern Aroostook County, Maine. The southernmost half of the infestation (Chapman-Squapan Area) was most critical, with extensive top kill and some tree mortality expected in 1963. The northern part, although under less stress, contained heavy budworm populations with even higher population levels predicted in 1963. Pending outcome of the 1963 early larval survey, plans are being made to treat about 470,000 acres with an aerial spray of DDT. Complicating this control program, however, is the high concentration of red spruce within the southern half of the proposed spray area. The phenology of the red spruce is such that the budworm larvae are protected from the aerial spray during the larger part of their feeding period. To overcome this problem, areas with high concentrations of red spruce will receive two spray applications of ½ pound of DDT in ½ gallon of fuel oil per acre each. The first application will be just before the larvae start mining into the red spruce buds, and the second application just prior to pupation. Timing of these applications will be very critical and will require considerable field checking. The remainder of the proposed spray area will receive the usual one application of 1 pound of DDT in 1 gallon of fuel oil per acre applied during the fifth and sixth larval instars.

**White-pine weevil,** *Pissodes strobi* (Peck). The white-pine weevil continued to be the major insect pest of white pine and is fairly well distributed throughout the range of its host tree. Reports indicate a general increase in weeviling throughout the Northeast. Suppression with ground equipment was carried out on only a few hundred acres, mostly in Pennsylvania and New York. Good results were obtained.

**Gypsy moth,** *Porthetria dispar* (L.). Cooperative suppression programs by the various States and ARS for the gypsy moth totaled more than 300,000 acres in 1962, distributed as follows: Pennsylvania, 76,000; New Jersey, 35,000; New York, 100,000; Massachusetts, 61,000; and Maine, 41,000. Of special significance were the areas treated in Pennsylvania and New Jersey. Both of these are outside of the regulated zone; however, male moths were trapped within these two areas in 1961. Preliminary test spraying with the bacterial insecticide Thuricide has shown great promise for control of the gypsy moth. These tests will probably be continued in 1963. A 10,000-acre infestation on the Green Mountain National Forest in Vermont was evaluated in the spring of 1962 and determined to be on the decline due to natural factors. Subsequent observations substantiated this prediction.

Aerial and ground surveys in 1962 indicate that heavy defoliation by the gypsy moth can be expected in 1963 throughout most of the New England States, Connecticut, and New York.

**Red-pine scale,** *Matsucoccus resinosae* B. & G. This serious pest continued its slow but relentless destruction of red pine throughout the known infested zone. Although at present restricted to within a 50-mile radius of New York City, it has the potential to spread much farther. No effective

controls are known, but New Jersey has exerted diligent efforts to suppress known infestations within the State by cutting infested stands.

**Balsam woolly aphid,** *Chermes piceae* (Ratz.). Subzero weather during February 1962 throughout Maine, New Hampshire, and Vermont, radically reduced populations of this serious pest of balsam fir. However, a sufficient population of the aphid survived to permit continuation of the infestation in most of these areas.

The successful establishment of the imported European predaceous beetle, *Laricobius erichsonii* Rosenh., in the three northern New England States has stimulated interest in this method of biological control. Further importations and releases of this predator are planned for 1963. A spot infestation of the balsam woolly aphid on Fraser fir was observed in the Shenandoah National Park, Va., this year. Practically all of the firs observed were infested with tip or gout form. Only an occasional attack on the trunk was observed. Some tree mortality due to this aphid was evident. No suppression activity is planned for this infestation in 1963.

**Pitch pine looper,** *Lambdina athasaria pellucidaria* (G. & R.). Aerial and ground surveys of Cape Cod, Mass., revealed an extensive outbreak of the pine looper throughout the mid-Cape area with smaller infestations near Provincetown in the north, south to Eastham, and extending west to West Falmouth. Feeding was particularly heavy north of Provincetown, in Pilgrim Springs State Park near Truro, and northeast of Eastham and Hyannis. Preliminary laboratory and field test with *Bacillus thuringiensis* in September gave promising results. These tests will be repeated in 1963 to perfect application techniques.

**Pine leaf aphid,** *Pineus pinifoliae* (Fitch). The cumulative injury caused by this insect remains severe on small white pine saplings and reproduction throughout Maine, New Hampshire, and Vermont. Larger trees are also showing the effects of this cumulative damage. In general, infestations appear to have declined slightly from last year.

**Beech scale,** *Cryptococcus fagi* (Baer). Wherever mature beech is found in New England high populations of beech scale are generally present, however, nectria infections may not always be present. This phenomenon is particularly apparent in certain areas in New Hampshire and Vermont. Although the reason for this is not known, some indications may be gained from a study established in Maine in 1950–51 to determine the reaction of beech scale-nectria to thinning. A series of 13 plots were set up where 7 were thinned and 6 remained unthinned. It appears from this study that dense stands of beech are more conductive to nectria infection, but as these stands are opened, either by thinnings or through mortality resulting from scale-nectria attack, the incidence of nectria attack diminishes.

**Forest tent caterpillar,** *Malacosoma disstria* Hbn. Light feeding was noted in a number of areas throughout the region, but populations have been at a comparatively low level for several years. Records of past outbreaks show a general buildup about every 10 years. Annual checks will be continued to determine when this increase will herald the start of the next outbreak.

**European pine shoot moth,** *Rhyacionia buoliana* (Schiff.). The European pine shoot moth was found for the first time in southeastern Merrimack County, N.H., on Austrian pine. It is now known to occur in only two counties (Merrimack and Rockingham) in New Hampshire. Severe infestations have been reported from Westmoreland and Cumberland Counties in Pennsylvania. Pennsylvania is discouraging pine planting in its southern counties because of the shoot moth. In northern West Virginia heavy populations of the insect on red pine were reported.

**Nantucket pine tip moth,** *Rhyacionia frustrana* (Comstock). Moderate injury to Scotch, Austrian, and red pine plantations by this insect was observed in Berks and Cumberland Counties, Pennsylvania. Injury was reported on pine in all counties along the eastern shore of Maryland. Virginia and West Virginia reported tip moth injury continuing at a high level. In Virginia, loblolly pine was also heavily attacked. Infestations are expected to continue at the present rate during 1963.

**Pine sawflies,** *Neodiprion* spp. Defoliation by the Virginia pine sawfly, *N. pratti pratti* (Dyar), continued in southern Maryland, central Virginia, and north central North Carolina. In general, defoliation was the lightest in many years, but the limits of the infestation did not change. Feeding by the sawfly is expected to be light in 1963.

Heavy defoliation of shortleaf and Virginia pine in several northeastern counties in Kentucky is believed to have been caused by the Virginia pine sawfly. The insect, however, has not yet been positively identified.

Light and scattered defoliation by the red-headed pine sawfly, *Neodiprion lecontei* (Fitch), was reported in Pennsylvania, Maryland, and Virginia. Some control measures were carried out in 1962. Surveys indicate an increase in extent and intensity of attacks in 1962.

**Southern pine beetle,** *Dendroctonus frontalis* Zimm. Scattered infestation of the southern pine bettle developed late in the summer in the Piedmont in the central part of Virginia. On the Eastern Shore, populations were negligible where they had been significant for the past few years. Quick salvage of killed and dying trees was undertaken by the State of Virginia. Followup aerial surveys are planned in 1963 with emphasis on salvage cuttings to bring the infestation under control.

**A leaf-mining weevil,** *Prionomerus calceatus* (Say). An unusual outbreak of this leaf-mining

weevil occurred in central and southeastern Kentucky on yellow poplar. Damage was attributed to both larval and adult weevil feeding. A drought, following this infestation, caused considerable damage to the weakened trees. Surveys to determine the limits and intensity of this infestation will be carried out in 1963.

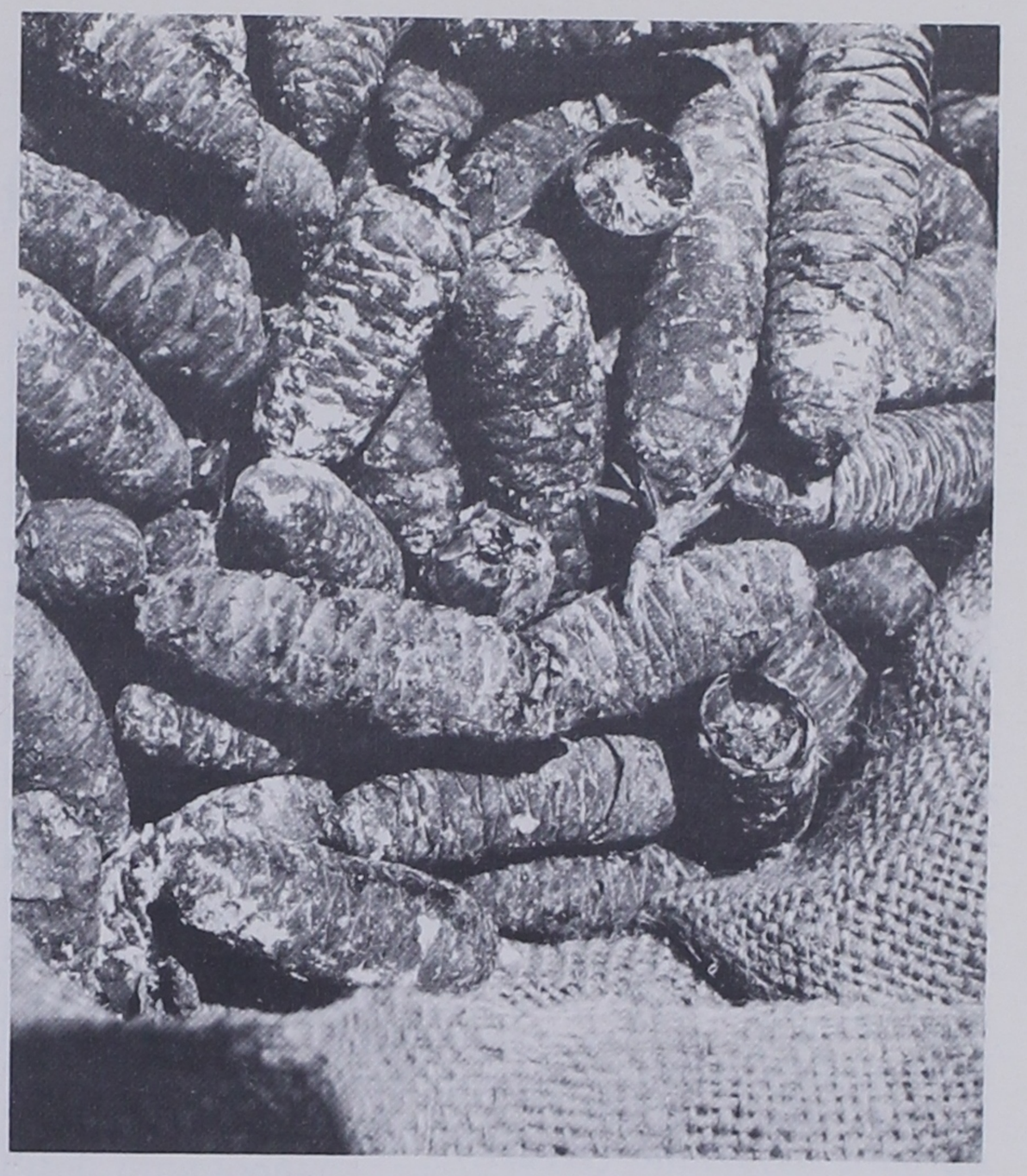
**Pales weevil,** *Hylobius pales* (Herbst). This weevil was quite common throughout the region, with damage restricted to planted pine. Considerable damage to natural pine seedlings and in Christmas trees plantings was reported from southern Pennsylvania. Newly planted loblolly pine on the Pocomoke State Forest in Maryland were heavily attacked, but natural reproduction was only slightly damaged. Severe mortality also occurred on 70 acres of planted white pine in Floyd County, Va.

**Pine spittlebug,** *Aphrophora parallela* (Say). Spittle masses of this insect were found in pines in Pennsylvania, Virginia, and West Virginia. Although infestations were heavier than usual, no serious damage is expected.

**Miscellaneous defoliators.** Defoliation by the linden looper, *Erannis tiliaria* (Harris), was moderate to heavy over much of Pennsylvania, the northern Berkshire area in Massachusetts, and parts of New Hampshire and Vermont. Serious defoliation by the saddled promient, *Heterocampa guttivitta* (Wlk.), occurred on 500 acres of beech-maple on the Mohawk Trail State Forest in Massachusetts. Additional, less intensive infestations, were reported in other areas throughout western Massachusetts. Based on past outbreaks, it is expected that these infestations will decline somewhat in 1963.

A serious outbreak of the fall cankerworm, *Alsophila pometaria* (Harris), occurred in southeastern and western Massachusetts and northeast of Roanoke, Va. A total of 2,500 acres were sprayed in Massachusetts and plans have been made to treat 1,000 acres in Virginia in 1963. About 1,045 acres of roadside trees along the Blue Ridge Parkway and in the Shenandoah National Park were sprayed with DDT to control the fall webworm, *Hyphantria cunea* (Drury). This action was taken to preserve the scenic beauty of the Blue Ridge Parkway and the Skyline Drive. Additional spraying is planned in 1963.

Scattered infestations of the larch sawfly, *Pristiphora erichsonii* (Htg.), were noted in northwestern Pennsylvania, causing up to 90-per-



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**Mature cones of balsam fir infested with an unknown dipterous larvae. Cones were collected in Vermont for seed extraction. (Photo by W. P. Hall, Vermont Forest Service.)**

cent defoliation in some areas. Of interest is the report that one larch plantation had been defoliated 9 consecutive years without apparent serious consequences. Brood II of the periodical cicada, *Magicicada septendecin* (L.), emerged in outbreak proportions in southern New Jersey, eastern Pennsylvania, and central Virginia. Although the killing of branch tips was spectacular and widespread, no significant tree damage is expected.

The locust leaf miner, *Xenochalepus dorsalis* (Thunberg), was quite prevalent in parts of Pennsylvania, Virginia, and West Virginia. Heavy defoliation of roadside trees by the Japanese beetle, *Popillia japonica* Newman, was observed in most of Virginia and eastern West Virginia. Heavy damage by the arborvitae leaf miner, *Argyresthia thuiella* (Pack.), and the birch leaf miner, *Fenusa pusilla* (Lepel.), were recorded throughout most of the New England States. Heavy infestations of the pine needle miner, *Exoteleia pinifoliella* (Chamb.), were noted on pitch pine in New Hampshire, Massachusetts, and Rhode Island.

# Index to Insects


| | Page |
|---|---|
| *Acleris variana* (Fern.) | 3 |
| *Agathis pumilus* (Ratz.) | 12 |
| Alaska spruce beetle | 3 |
| *Alsophila pometaria* (Harris) | 15, 21, 27 |
| *Anomala oblivia* Horn | 22 |
| *Aphrophora parallela* (Say) | 21, 27 |
| *Aphrophora saratogensis* (Fitch) | 21 |
| Arborvitae leaf miner | 27 |
| *Argyresthia thuiella* (Pack.) | 27 |
| *Argyrotaenia* sp | 15 |
| Arizona five-spined ips | 18 |
| *Aroga websteri* Clarke | 6, 9 |
| Aspen leaf miner | 15 |
| Aspen leaf tier | 13 |
| Bagworm | 22 |
| Balsam-fir sawfly | 13 |
| Balsam woolly aphid | 5, 24, 26 |
| *Barbara colfaxiana* (Kearf.) | 9 |
| Beech scale | 26 |
| Birch leaf miner | 27 |
| Black-headed budworm | 3 |
| Black Hills beetle | 16, 19 |
| Black turpentine beetle | 22, 23 |
| Blue-sided tent caterpillar | 8 |
| California five-spined ips | 19 |
| California flatheaded borer | 8 |
| Cankerworms | 15, 21, 27 |
| Carpenterworm | 22 |
| *Catocala agrippina* Stkr | 25 |
| Cedar bark beetle | 3, 9 |
| *Chermes piceae* (Ratz.) | 5, 24, 26 |
| *Choristoneura conflictana* (Wlk.) | 8, 13, 17, 21 |
| *Choristoneura fumiferana* (Clem.) | 4, 8, 11, 13, 16, 18, 20, 25 |
| *Choristoneura pinus* Free | 20 |
| *Coleophora laricella* (Hbn.) | 5, 11, 21 |
| *Coloradia pandora* Blake | 16 |
| Cone moths | 9, 25 |
| Cone resin midge | 9 |
| *Conophthorus lambertianae* Hopk | 9 |
| *Contarinia* spp. | 5, 9, 12 |
| *Contarinia constricta* Condr | 12 |
| *Contarinia pseudotsugae* Condr | 12 |
| *Cryptococcus fagi* (Baer) | 26 |
| *Cylindrocopturus eatoni* Buch | 8 |
| *Dasychira plagiata* (Wlk.) | 21 |
| *Dendroctonus brevicomis* LeC | 5, 6 |
| *Dendroctonus borealis* Hopk | 3 |
| *Dendroctonus convexifrons* Hopk | 19 |
| *Dendroctonus engelmanni* Hopk | 6, 11, 13, 16, 17 |
| *Dendroctonus frontalis* Zimm | 23, 26 |
| *Dendroctonus jeffreyi* Hopk | 8 |
| *Dendroctonus monticolae* Hopk | 5, 7, 9, 13, 16 |
| *Dendroctonus ponderosae* Hopk | 15, 19 |
| *Dendroctonus pseudotsugae* Hopk | 6, 9, 10, 13, 17, 18 |
| *Dendroctonus terebrans* (Oliv.) | 22, 23 |
| *Dendroctonus valens* LeC | 8, 10, 22 |
| *Diapheromera femorata* (Say) | 22, 25 |
| *Dichelonyx crotchi* Horn | 9 |
| *Dichelonyx vicina* Fall | 9 |
| *Dioryctria* sp | 25 |
| *Dioryctria abietella* (D. & S.) | 9 |
| *Dioryctria zimmermani* (Grote) | 22 |
| *Diprion similis* (Htg.) | 22 |
| Douglas-fir beetle | 6, 9, 10, 14, 17, 18 |
| Douglas-fir engraver | 6, 10 |
| Douglas-fir needle gall midge | 5, 12 |
| Douglas-fir twig beetle | 8 |
| Douglas-fir tussock moth | 5, 9, 11, 19 |
| *Dryocoetes confusus* Sw | 15, 17, 19 |
| *Earomyia* spp | 9 |
| Eastern tent caterpillar | 21 |
| Elm leaf beetle | 22 |
| Elm spanworm | 24 |
| Engelmann spruce beetle | 6, 11, 13, 16, 17 |
| *Ennomos subsignarius* (Hbn.) | 24 |
| *Erannis tiliaria* (Harris) | 27 |
| *Eucosma bobana* Kearf | 9 |
| *Eucosma sonoma* (Kearf.) | 22 |
| European pine shoot moth | 4, 21, 26 |
| European preadaceous beetle | 26 |
| *Exoteleia pinifoliella* | 27 |
| Fall cankerworm | 15, 21, 27 |
| Fall webworm | 19, 22, 25, 27 |
| *Fenusa pusilla* (Lepel.) | 27 |
| Fir engraver | 6, 7, 10, 15, 18 |
| Flatheaded fir borer | 9 |
| Forest tent caterpillar | 21, 24, 26 |
| *Galerucella xanthomelaena* (Schr.) | 22 |
| Great Basin tent caterpillar | 14, 17, 19 |
| Gypsy moth | 25 |
| *Hedulia injectiva* Hein | 9 |
| *Hemerocampa pseudotsugata* McD | 5, 9, 11, 19 |
| *Hemileuca nevadensis* Stretch | 19 |
| Hemlock sawfly | 3 |
| *Heterocampa guttivitta* (Wlk.) | 27 |
| Horntails | 9 |
| *Hylobius pales* (Herbst) | 23, 27 |
| *Hylobius radicis* (Buch.) | 22 |
| *Hyphantria cunea* (Drury) | 19, 22, 25, 27 |
| Introduced pine sawfly | 22 |
| *Ips* spp | 3, 7, 10, 15, 22, 23 |
| *Ips avulsus* Eichh | 23 |
| *Ips calligraphus* Germ | 23 |

| | Page |
|---|---|
| *Ips confusus* (LeC.) | 19 |
| *Ips lecontei* Sw | 18 |
| *Ips oregonis* (Eichh.) | 6, 10, 17 |
| *Ips pini* (Say) | 22 |
| *Ips ponderosae* Sw | 10 |
| Ips (pine engravers) | 3, 7, 10, 22, 23 |
| Jack-pine budworm | 20 |
| Japanese beetle | 27 |
| Jeffrey pine beetle | 8 |
| *Lambdina athasaria pellucidaria* (G. & R.) | 26 |
| *Lambdina fiscellaria lugubrosa* (Hulst) | 4 |
| *Lambdina fiscellaria somniaria* (Hulst) | 5 |
| Larch casebearer | 5, 11, 21 |
| Larch sawfly | 12, 22, 27 |
| Large aspen tortrix | 8, 13, 17, 21 |
| *Laricobius erichsonii* Rosenh | 26 |
| *Laspeyresia* spp | 9 |
| Leaf-mining weevil | 26 |
| Linden looper | 27 |
| Locust borer | 22 |
| Locust leaf miner | 22, 27 |
| Lodgepole needle miner | 8, 12, 15 |
| *Maecolaspis pini* (Barber) | 25 |
| *Magicicada septendecim* (L.) | 27 |
| *Malacosoma americana* (Fab.) | 21 |
| *Malacosoma constrictum* Stretch | 8 |
| *Malacosoma disstria* (Hbn.) | 21, 24, 26 |
| *Malacosoma fragile* (Stretch) | 14, 17, 19 |
| *Matsucoccus acalyptus* Herbert | 13, 19 |
| *Matsucoccus resinosae* B. & G | 25 |
| Mealybugs | 15 |
| *Megacyllene robiniae* (Forst.) | 22 |
| *Melanophila californica* Van Dyke | 8 |
| *Melanophila drummondi* (Kirby) | 9 |
| Mountain pine beetle | 5, 7, 9, 13, 16 |
| Nantucket pine tip moth | 21, 25, 26 |
| *Neodiprion* spp | 5, 13, 19, 22, 23, 26 |
| *Neodiprion abietis* (Harr.) | 13 |
| *Neodiprion abietis* complex Ross | 9 |
| *Neodiprion contortae* Ross | 13 |
| *Neodiprion excitans* Roh | 24 |
| *Neodiprion fulviceps* complex | 13 |
| *Neodiprion lecontei* (Fitch) | 22, 23, 26 |
| *Neodiprion pratti banksianae* (Roh.) | 22 |
| *Neodiprion pratti pratti* (Dyar) | 22, 24, 26 |
| *Neodiprion sertifer* (Geoff.) | 22 |
| *Neodiprion taedae linearis* (Ross) | 22, 23 |
| *Neodiprion tsugae* Midd | 3 |
| *Neophasia menapia* Feld | 12 |
| *Nepytia* sp | 3 |
| Nevada buck moth | 19 |
| Oregon pine ips | 6, 10, 17 |
| *Orgyia* spp | 15 |
| *Orgyia antiqua* | 13 |
| *Paleacrita vernata* (Peck) | 15, 21 |
| Pales weevil | 23, 27 |
| Pandora moth | 16 |
| Pecan worm | 25 |
| Periodical cicada | 27 |
| *Petrova* sp | 22 |
| *Phenacaspis pinifoliae* (Fitch) | 5, 12 |
| *Phloeosinus* sp. | 9 |
| *Phloeosinus squamosus* Blkm | 3 |
| *Phyllocnistis populiella* Chamb | 15 |
| Pine butterfly | 12 |
| Pine chafer | 22 |
| Pine colaspis | 25 |
| Pine cone moth | 9 |
| Pine engraver | 3, 7, 10, 22 |
| Pine leaf aphid | 26 |
| Pine needle miner | 17, 27 |
| Pine needle sheath miner | 5, 12 |
| Pine needle scale | 5, 12 |
| Pine reproduction weevil | 8 |
| Pine root collar weevil | 22 |
| Pine sawfly | 5, 13, 19, 22, 23, 26 |
| Pine seed moth | 9 |
| Pine spittlebug | 21, 27 |
| Pine tortoise scale | 21 |
| Pine tussock moth | 21 |
| *Pineus pinifoliae* (Fitch) | 26 |
| Pinyon needle scale | 13, 19 |
| *Pissodes curriei* Hopk | 13 |
| *Pissodes nemorensis* Germ | 23 |
| *Pissodes strobi* (Peck) | 21, 25 |
| Pitch pine looper | 26 |
| *Pityophthorus pseudotsugae* Sw | 8 |
| *Popillia japonica* Newman | 27 |
| *Porthetria dispar* (L.) | 25 |
| *Prionomerus calceatus* (Say) | 26 |
| *Prionoxystus robiniae* (Peck) | 22 |
| *Pristiphora erichsonii* (Hartig) | 12, 22, 27 |
| *Pseudohylesinus* spp | 6 |
| *Puto* sp | 15 |
| *Puto cupressi* (Coleman) | 15 |
| "*Recurvaria*" sp | 17 |
| "*Recurvaria*" *milleri* Busck | 8, 12, 15 |
| Red-headed pine sawfly | 22, 23, 26 |
| Red-pine scale | 25 |
| Red turpentine beetle | 8, 10, 22 |
| Reproduction weevils | 23 |
| *Rhyacionia buoliana* (Schiff.) | 4, 21, 26 |
| *Rhyacionia frustrana* (Comst.) | 21, 25, 26 |
| Roundheaded pine beetle | 19 |
| *Rübsaamenia keeni* Foote | 9 |
| Rusty tussock moth | 13 |
| Saddled prominent | 27 |
| Sagebrush defoliator | 6, 9 |
| Saratoga spittlebug | 21 |
| Sawflies | 5, 13, 19, 22, 23, 24 |
| *Sciaphila duplex* (Wlsh.) | 13 |
| *Scolytus unispinosus* LeC | 6, 10 |
| *Scolytus ventralis* LeC | 6, 7, 10, 15, 18 |
| Seed maggots | 9 |
| Shoot borer | 22 |
| Silver fir beetles | 6 |
| *Sirex* spp | 9 |
| Southern pine beetle | 23, 26 |
| Spring cankerworm | 15, 21 |
| Spruce budworm | 4, 8, 11, 13, 16, 18, 20, 25 |

| | Page |
|---|---|
| Spruce mealybug | 15 |
| Sugar-pine cone beetle | 9 |
| *Systena marginalis* (Ill.) | 25 |
| *Tetropium velutinum* LeC | 13 |
| *Thyridopteryx ephemeraeformis* (Haw.) | 22 |
| Tube moth | 15 |
| *Tuomeyella liriodendri* (Gmel.) | 21 |
| *Tuomeyella numismaticum* (P. & M.) | 21 |
| Tussock moths | 15 |
| Virginia pine sawfly | 24, 26 |
| Walkingstick | 22, 25 |
| Western balsam bark beetle | 15, 17, 19 |
| Western hemlock looper | 4 |
| Western larch roundheaded borer | 13 |
| Western oak looper | 5 |
| Western pine beetle | 5, 6 |
| Western six-spined ips | 10 |
| White-fir sawfly | 9 |
| White-pine weevil | 21, 25 |
| *Xenochalepus dorsalis* (Thunb.) | 22, 27 |
| *Zelleria haimbachi* Busck | 5, 12 |
| Zimmerman pine moth | 22 |


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